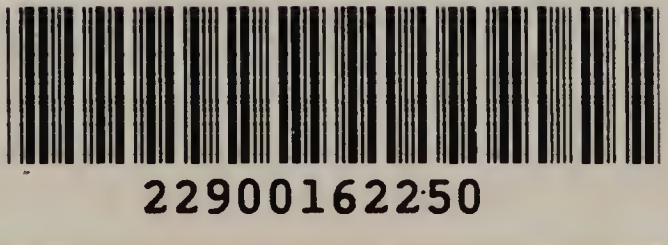
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PHARMACEUTICAL JOURNAL

AND

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SECOND SERIES.

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CONTENTS.

SECOND SERIES, VOL. III.—1862.

No. I.

Progression and the Bye-Laws, 1.

Transactions of the Pharmaceutical Society : Meeting of the Council, 4—List of Members, Associates, and Apprentices (*continued*), 4.

Provincial Transactions : Liverpool Chemists' Association, 5.

Original and Extracted Articles : Notes on Chinese Materia Medica. Daniel Hanbury, F.L.S., 6—On the Colour-tests for Strychnia, and the Diagnosis of the Alkaloids, (*continued.*) William A. Guy, M.B. Cantab., 11—On *Ricinus inermis*, Mill. W. F. Daniell, M.D., F.L.S., etc., 15—Results of Physical and Chemical Investigation and Applications in the Arts, 16—The Production of Alizarin from Naphthalin—On the Estimation of Mercury—Extraction of Silver from Galena—Preparation of Hydrate of Baryta. On the Useful Plants of Paraguay. Domingo Parodi, 18—On the Tænifuges (Anthelmintics) of Abyssinia. Dr. Courbon, 20—Commercial Products of the Asphodel. Sir W. J. Hooker, K.H., F.R.S., 24—On Some Phenomena attending Combustion in Rarefied Air. E. Frankland, F.R.S., 24—A Means of Detecting the Presence of Castor-Oil in the Volatile Oils. Harry Napier Draper, F.C.S.L., 27—On Platinum. Professor Faraday, D.C.L., F.R.S., 28—Pine-Wool. M. C. Cooke, F.S.S., 29—Oleum Gossypii—(Cotton-Seed Oil). W. H. Weatherly, of Freehold, N.J., 30—Turpentine as an Anæsthetic, 32—Trifolium in Fœno a remedy for Hooping-Cough, 32—Correspondence relating to the Progress of the Society, 33—Opifex—Mr. Henry Booth—Mr. G. G. Hornsby—Mr. T. B. Groves—Are we progressing? Mr. T. S. Hopwood—Our Past and Future Progress : An Associate—Mr. Edward R. Hornby. Pharmacy in Manchester, 41—Letter from Mr. Vizer, 42—*Miscellanea*, 44—*Books Received*, 46—*Correspondents*, 46—*Register of Members, Associates, and Apprentices*, 47.

No. II.

The Jacob Bell Memorial Scholarships, 105—Progression and the Bye-Laws, 106—The Prevention of Accidental Poisoning, 106.

Transactions of the Pharmaceutical Society : Meeting of the Council, 107—List of Members, Associates, and Apprentices (*continued*), 107—The Jacob Bell Memorial Scholarships, 107—Appointment of Local Secretaries, 108—Protection against Accidental Poisoning, 108—The Proposed Alteration of the Bye-Laws, 108.

Provincial Transactions : Brighton Chemists' Association, 109

Original and Extracted Articles : On the Adulteration of Black Hellebore (*Helleborus niger*) with Bane-Berry (*Actæa spicata*). Robert Bentley, M.R.C.S. Eng., F.L.S., 109—On the Colour-tests for Strychnia, and the Diagnosis of the Alkaloids (*concluded*), William A. Guy, M.B. Cantab., 112—Liquid Diffusion applied to Analysis. Thomas Graham, Esq., F.R.S., 118—Results of Physical and Chemical Investigation and Applications in the Arts, 121—The Artificial Production of Ice—On the Solidification of Carbonic Acid—The Chemical Nature of the Silkworm's Skin—Preparation of Perchloride of Iron—White Gunpowder—On the Preparation of Chloroform.—The Vegetable Products of Siam. Sir Rt. H. Schomburgk, K.C.H.,

123—The British Pharmacopœia, 128—On an Improved Method of Preparing Sodæ Carbonas Siccata. Harry Napier Draper, F.C.S.L., 129—Photo-Zincography, 130—On the Physical Basis of Solar Chemistry. John Tyndall, Esq., F.R.S., 131—Correspondence relating to the Progress of the Society, 137—Mr. D. Watson—Mr. J. Houlton—Mr. B. S. Proctor—1841—Mr. J. Ball—E. P.—Mr. W. Judd—Mr. W. F. Parkway—F. M.—Mr. W. Hartley—Mr. J. Baker Edwards—Mr. W. Flux. Pharmacy in Manchester, 146—Prescribing by Druggists, 147—Sale of Drugs by Grocers, 147—Charge of Manslaughter against a "Medical Botanist," 149—*Miscellanea*, 149—*Books Received*, 152—*Correspondents*, 152.

No. III.

The Question of the Bye-Laws, 153—The Representation of Pharmacy at the International Exhibition of 1862, 154—The Jacob Bell Memorial Scholarships, 155—The Pereira Memorial Fund, 156.

Transactions of the Pharmaceutical Society: Meeting of the Council, 157—List of Members, Associates, and Apprentices (*continued*), 157—The Jacob Bell Memorial Fund—Subscriptions Received since the last Announcement, 157.

Original and Extracted Articles: Results of Physical and Chemical Investigation and Applications in the Arts, 158—On the Detection of Phosphorus in cases of Poisoning—Reduction of Copper in Fine Powder—On the Action of Ammonia and Atmospheric Air on Metallic Copper. Observations on Bitter Almond and Cherry Laurel Distilled Waters. Monsieur Mayet, 161—On the Oleaginous Matter formed on Dissolving different kinds of Iron in Dilute Acids. Emerson J. Reynolds, 162—Note on a case of Poisoning by the Berries of Solanum pseudo-Capsicum. M. Montane, of Moissac, 163—On Oil of Sesamum (*Sesamum Orientale*), and its Employment in Pharmacy. M. Roth, of Mulhouse, 164—On Anacahuite Wood. Berthold Seemann, Ph.D., 164—Norwegian Castor, 165—Arsenious Acid in Large Doses: a Substitute for Quinine. Mr. J. Turner, 166—On the Colouring Matters derived from Coal-Tar. Mr. Perkin, 166—On the Theory of Three Primary Colours. Prof. J. C. Maxwell, 179—Observations on the Etua Tree (*Kiglia Africana*), 182—On the Mode of Dissecting Leaves, 182—License for the Sale of Methylated Spirit, 183—Distillation of Beet Root Spirit in this Country, 183—Chicory, the Quantity produced, and the Duty charged on it, 183—Habits of the Cuttle-Fish, 184—Aerolites, 184—Correspondence relating to the Progress of the Society, 186—The Title of Pharmaceutical Chemist, 192—The Prevention of Accidental Poisoning, 192—Case of Poisoning by Aconite, 193—Unlawful Administration of Cantharides, 194—Explosion of Paraffin Oil, 195—*Miscellanea*, 196—*Correspondents*, 200.

No. IV.

The Difficulty—Is it Present or Prospective? 201—Licence for the Use of Stills or Retorts, 202.

Original and Extracted Articles: Notes on Chinese Materia Medica (*continued*). Daniel Hanbury, F.L.S., 204—On the Theory of Primary Colours. J. B. Kearney, Esq., 210—Results of Physical and Chemical Investigation and Applications in the Arts, 211—On the Freezing and Boiling Points of Water—Formation of the Green Matter of Leaves under the Influence of the Electric Light—On Resin of Scammony—Solubility of Arsenious Acid in Glycerine—Valuation of Nitre—Action of Nitrous Acid on Salts of the Suboxide of Copper. On the Useful Plants of Paraguay (*continued*), Domingo Parodi, 214—On the New Anæsthetic Kerosolene. Ephraim Cutter, M.D., 216—The Cinchonæ in India, 217—On Tinkalzite (Borate of Lime and Soda) from Peru. T. L. Phipson, 217—The Water Barometer, 218—Correspondence relating to the Progress of the Society, 219—Mr. Frederic Kendall—Mr. W. Woodward—Mr. B. Edman, M.P.S.—A Major Associate—Mr. George Nind. A Fee for Certified Prescription Copies, 223—The Right of Chemists to Prescribe, 224—Aerolites, 225—Sir Benjamin Brodie on Homœopathy, 225—British Association, 228—The British Pharmacopœia, 242—Large Dose of Tincture

of Aconite, 243—Alleged Poisoning by Arsenic, 243—*Miscellanea:* On Digitaline—White Gunpowder—Kendal Green—New Formulæ for Sinapisms—The Local Employment of Sulphate of Alumina and Zinc—Glycerole—Chlorate of Potash for Fœtid Breath—Deaths from Chloroform, 245—*Obituary:* Professor Quekett, 247—*Correspondents;* 248.

No. V.

The Representation of Pharmacy at the International Exhibition of 1862, 249.

Transactions of the Pharmaceutical Society: Meetings of the Council, 251—List of Members, Associates, and Apprentices (*continued*), 251—The Jacob Bell Memorial Fund—Subscriptions Received since the last Announcement, 251—Pharmaceutical Meeting: Donations to the Library and Museum, 252—Bust of the late Mr. Jacob Bell, 253—The Jacob Bell Memorial Scholarships, 253—Distribution of Prizes, 254—Prizes for Herbaria, 256.

Provincial Transactions: Liverpool Chemists' Association—The Annual Meeting, 257.

Original and Extracted Articles: Notes on Chinese Materia Medica (*continued*). Daniel Hanbury, F.L.S., 260—Description of Casella's new Mercurial Minimum Thermometer. Mr. J. Attfield, 264—Another Point in Question. Mr. A. F. Haselden, 266—Results of Physical and Chemical Investigation and Applications in the Arts, 268—Chemical Relations of Guanine, Zanthine, Theobromine, and Caffeine—On the Constitution of Aloes—On Rubidium and Cæsium. On the Useful Plants of Paraguay. Domingo Parodi, 272—On the Manna of Sinai, and the Manna of Syria. M. Berthelot, 274—The Adulteration of Musk, and the Methods of Examining the same. Prof. W. Bernatzik, 275—On the Antagonistic Effects of Opium and Quinine. Dr. Nivison, 277—On the Conversion of Monohydrated into Common Phosphoric Acid. J. M. Maisch, 278—Notes on Kittool Fibre. P. L. Simmonds, F.S.S., 280—On the History of the Alkali Manufacture. Mr. Gossage, 281—On the Action of Water on Lead. Dr. F. Crace Calvert, F.R.S., 283—On the Properties of Sulphate of Aniline, 284—On Perchloric Acid and its Hydrates. Professor Roscoe, 284—On the Cause and Treatment of the Potato Disease. Dr. A. de Bary, 285—On the Deleterious Effect of Light on Potatoes, 287—On the Treatment of Gout by Guaco. E. W. Pritchard, M.D., etc., 288—More Poisonings by Fungi in France, 289—Suicide by Laudanum, 289—*Miscellanea*, 290—*Review*, 295—*Books Received*, 296—*Correspondents*, 296.

No. VI.

The Right of Chemists and Druggists to Prescribe, 297.

Transactions of the Pharmaceutical Society: Meetings of the Council, 299—List of Members, Associates, and Apprentices (*continued*), 299.

Pharmaceutical Meeting: Donations to the Library and Museum, 299—Prizes for Herbaria, 300—On Medicinal Extracts, taking Belladonna as an Example. Peter Squire, F.L.S., 300.

Pharmaceutical Meeting, Edinburgh: The President's Address, 308—Professor Archer's Address, 311.

Original and Extracted Articles: Notes on Chinese Materia Medica (*continued*). Daniel Hanbury, F.L.S., 315—On some Applications of Carbolic Acid, or Hydrate of Oxide of Phenyle. Dr. F. Crace Calvert, F.R.S., 319—Eclectic Pharmacy. S. W. Cleave, 320—The New Mercurial Minimum Thermometer. W. Symons, 323—Reputed Specific for Small Pox, 323—Results of Physical and Chemical Investigation and Applications in the Arts, 324—The Fertilizing Power of Guano—On the Effect of Filtering the Air in Preventing Fermentation, Putrefaction, and Crystallization—The Action of Porous Bodies in Inducing Chemical Combinations—Production of Chloride and Bromide of Cyanogen—Extract of Vanadium from Rutile—Crystallized Manganate of Soda—Detection of Sulphurous Acid—Researches on Hypophosphite of Lime. M. Gérard Jaussen, 327—Preservation of Red Precipitate Ointment. M. Keffer, 329—Preparation of Castorin. M. Valenciennes, 329—On some Varieties of Tannin. John Stenhouse, LL.D., F.R.S., F.C.S., 329—On Po-

dophyllin. Harry Napier Draper, F.C.S.L., 331—Ginseng, 332—A Few General Remarks on the Professional Education of Medical and Pharmaceutical Students. Professor Bentley, F.L.S., 333—Blunders in Pharmaceutical Directions, 335—Scientific Nomenclature, 335—A Pharmaceutical Dispensing Price Mark, 338—Druggists' Festival at Glasgow, 340—*Miscellanea*, 341—*Correspondents*, 344.

No. VII.

The International Exhibition of 1862, 345—The Proposed Amended Bye-Laws of the Pharmaceutical Society, 346.

Transactions of the Pharmaceutical Society : Meeting of Council, 348—Special Meetings of the Council, 348—List of Members, Associates, and Apprentices (*continued*), 348—The Jacob Bell Memorial Fund, 349—The Proposed Amended Bye-Laws, and the Existing Bye-Laws of the Pharmaceutical Society, 349—Pharmaceutical Meeting, 367—Donations to the Library and Museum, 367—On Medicinal Extracts; taking Belladonna as an Example. Peter Squire, F.L.S. (*Adjourned discussion*), 368.

Provincial Transactions : Liverpool Chemists' Association, 372.

Original and Extracted Articles : On the Preparation of Extracts. Mr. Thomas B. Groves, 375—Medicinal Extracts from the Fresh Plants. Mr. G. B. Francis, 377—On the Adulteration of Tin Foil. Mr. J. H. Baldock, 378—Casella's Thermometer, 380—Report of the Results of Physical and Chemical Investigations—Comparative Changes of Temperature in the Air and in the Earth—On Chloro-Sulphuric Acid, 381—Action of Water on Commercial Chloride of Lime, and Remarks on its Chemical Constitution. M. Fresenius, 383—A New Local Anæsthetic. M. Fournié, 385—On Certain Reactions of Cinchonine. M. Horace Kœchlin, 385—Poisoning from Diseased Grapes, 386—On the Starch of Unripe or Green Fruits; and the Relations between it and the Development or Maturation of Fruits. M. Payen, 386—*Miscellanea*, 388—*Books Received*, 391—*Correspondents*, 392.

No. VIII.

The Authority of the Pharmacopœia, 393—The Improper Introduction and Designation of New Medicines, 394.

Transactions of the Pharmaceutical Society : Meetings of Council, 396—List of Members, Associates, and Apprentices (*continued*), 396—Special General Meeting for the Confirmation of the Bye-Laws, 397—On Spectrum Analysis (*with Cuts*). W. Miller, M.D., LL.D., 399—Pharmaceutical Meeting, Edinburgh—The Influence of the Study of Comparative Therapeutics on the Progress of Pharmacy. Mr. John Gamgee, 414.

Provincial Transactions : Liverpool Chemists' Association, 419.

Original and Extracted Articles : Notes on the Chinese Materia Medica (*continued*). Daniel Hanbury, F.L.S., 420—Ferri Ammonio-Phosphas. Mr. W. Wilkinson, 425—Apparatus for Spectrum Analysis. Mr. Alexander Waugh, 236—Report of the Results of Physical and Chemical Investigations, 427—On the Estimation of Sulphur in Iron or Copper Pyrites—Researches on Galbanum—On the Essential Oil of Chamomile—Matricaria Chamomilla—On the Influence of Cultivation upon Medicinal Plants, 430—On a New Method of Estimating Tannic Acid. M. K. Hammer, 433—Tasteless Pills. Mr. R. C. Furley, 434—*Miscellanea :* Explosion of Paraffin—Poisoning by Nitrous Fumes—Anarcotine—The Oil Springs of America and Canada—Scientific Nomenclature—Comparative Weight of Drops of Various Fluids—Attempted Suicides by Laudanum—Deaths from Chloroform—Alleged Death from Poison—Charge of Administering Poison, 434—*Review :* "Household Medicines," by John Gardner, M.D., 437—*Correspondents*, 440.

No. IX.

The International Exhibition of 1862, 441.

Transactions of the Pharmaceutical Society : Meetings of Council, 443—List of Mem-

bers, Associates, and Apprentices (*continued*), 443—The Jacob Bell Memorial Fund. Subscriptions Received since the last Announcement, 444—Pharmaceutical Meeting, 444—Donations to the Library and Museum, 444—On the Nutritive Value of Dika Bread. Mr. J. Attfield, F.C.S., 445—On the Mineral Constituents of Plants (*first paper*). Mr. J. Attfield, 447—Poisons not always Poisons (*with cuts*). Mr. J. Attfield, 453—New American Remedies—*Podophyllum peltatum.* Professor Bentley, 456—On Plants in a State of Life or Action, and their Influence in Nature. A Lecture delivered at the Pharmaceutical Society, Feb. 9, 1862. Professor Bentley, 464—Pharmaceutical Meeting, Edinburgh, 478.

Provincial Transactions: Liverpool Chemists' Association, 479.

Original and Extracted Articles: Report of Results of Physical and Chemical Investigations, 479—On the Nature of the Gas evolved from Leaves during the Decomposition of Carbonic Acid, 479– On some Coloured Reactions of Phenol (Carbolic Acid). M. Monnet, 483—The Products of Decomposition of the Resin of Guaiacum. MM. Halsiwetz and De Gilm, 483—Detection of Colza Oil when mixed with other Oils. M. Schneider, 484—On Cotton Oil Cake. F. Crace Calvert, F.R.S., 485—Deaths from Carbonic Acid Gas, 485—Methylated Spirit for Tinctures, 486—Tasteless Pills. Mr. S. Banner, 487—*Books Received*, 487—*Correspondents*, 488.

No. X.

Pharmaceutical Responsibility *versus* Free Trade in Physic, 489—Appointment of Local Secretaries, 490—The New Bye-Laws, 490.

Transactions of the Pharmaceutical Society: Financial Statement, 491—Subscribers to the Benevolent Fund, 492—Meeting of Council, 493—Botanical Prize for 1863, 493—Free Admission to the Royal Botanic Society's Gardens, Regent's Park, 494—Pharmaceutical Meeting—Donations to the Library and Museum, 494—On the Manufacture of Kelp. Edw. C. C. Stanford, F.C.S., 495—Vesicating Collodions. Mr. Charles R. C. Tichborne, 506—A Process for Estimating Tannic Acid in Galls. Mr. J. H. Marriage, 509—Henbane, its Preparations and Doses. Mr. Barnard S. Proctor, 510—Pharmaceutical Meeting, Edinburgh, 514—On Dialysis, or Liquid Diffusion, applied to Analysis, the Preparation of Medicines, etc. By Theophilus Redwood, Ph.D., 515.

Original and Extracted Articles: Alloxan found by Dialysis in an Animal Secretion. By Baron Liebig, 528—Report of the Results of Physical and Chemical Investigations, 529—On a New Form of Barometer—On the Detection of Bismuth in Presence of Copper—Poisonous Effects of Carbonic Oxide. By H. Letheby, M.B., M.A., etc., 531—On the Composition of Chloric Ether. By A. Norman Tate, F.C.S., 533—Poisons not always Poisons, 533—The Supply of Medicines to Charitable Institutions, 534—*Miscellanea*, 535—*Correspondents*, 536.

No. XI.

Qualification for Appointment as Dispenser in the Army, 537—Pharmacy at the International Exhibition, 538.

Transactions of the Pharmaceutical Society: Meetings of Council, 539—List of Associates and Apprentices (*continued*), 539—Pharmaceutical Meeting, 540—Donations to the Library and Museum, 540—New American Remedies (*continued*)—Hydrastis Canadensis. Professor Bentley, 540—On Hydrastine,an Alkaloid occurring in Hydrastis Canadensis. J. Dyson Perrins, F.C.S., 546—On the Preparation of Iodide of Potassium and some other Iodides. W. Stevens Squire, Ph.D., F.C.S., 548—Special General Meeting for the Confirmation of the Bye-Laws, 550—Pharmaceutical Meeting, Edinburgh, 550.

Provincial Transactions: Liverpool Chemists' Association, 559.

Original and Extracted Articles: On Coating Pills. Barnard S. Proctor, 562—On the Occurrence of Berberine in *Xanthorrhiza apiifolia*. J. Dyson Perrins, F.S.S., 567—Sulphide of Arsenic in Commercial Sulphide of Antimony. R. Reynolds, F.C.S.,

568—Report of the Results of Physical and Chemical Investigations—On the Chemical Composition of Magenta—Action of Reducing Agents on Rosaniline—On the Association of Rubidium with Potassium in Nature—On the Preparation of Asparagin, 570—The Granulation of Medicines. Thomas Skinner, M.D., 572—The Lithia Springs of Baden-Baden. J. Althaus, M.D., 577—On the Preparation of Menyanthine, and on the Essential Oil of Ledum. MM. Kromayer and Froehde, 579—On the Compound of Iodate and Iodide of Sodium. M. Rammelsberg, 579—Preparation of Vermilion. M. Ringaud, 580—Preparation of Oxalic Ether. MM. Toussaint and Kalle, 580—New Material for Thickening Mordants in Dyeing. M. Schwartz, 580—*Miscellanea,* 581—*Correspondents,* 584.

No. XII.

Pharmacy at the International Exhibition, 585—The Benevolent Fund, 586—General Rules relating to the Benevolent Fund, 588.

Transactions of the Pharmaceutical Society: Meetings of Council, 581—List of Members (*continued*), 589—Conversazione, 589—Twenty-first Anniversary of the Pharmaceutical Society, 591—Report of the Council, 594—Adjourned Meeting, 601—Election of Council, 602.

Provincial Transactions: Brighton Chemists' Association, 602—Presentation of a Testimonial to Professor Bentley, 603.

Original and Extracted Articles: Antigranulation. A. F. Haselden, 603—Report of the Results of Physical and Chemical Investigations, etc., 606—On the Preparation of Sulphuric Acid free from Arsenic, 606—Action of Permanganate of Potash on Iodide of Potassium, 608—General Council of Medical Education and Registration, 608—Report of the Pharmacopœia Committee of the General Medical Council, 608—On the Introduction of the Cinchona Plant into India. Clements R. Markham, F.R.G.S., 611—On the Inefficiency of Henbane as usually prescribed. M. Donovan, M.R.I.A., 618—Deep Well at Brighton, 621—The Trade in Liquorice. P. L. Simmonds, F.S.S., 623—Alleged Neglect in the Supply of Medicine, 625—*Miscellanea,* 626—*Review:* Sketches of the Natural History of Ceylon. Sir J. Emerson Tennent, 630—*Books Received,* 632—*Correspondents,* 632.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. III.—No. I.—JULY 1st, 1861.

PROGRESSION AND THE BYE-LAWS.

We insert several letters this month relating to suggestions which have been made for altering the Bye-laws of the Society. An impression seems to exist among some of our Members that the alterations referred to in the Annual Report of the Council were sanctioned by the Members at the Anniversary Meeting, and that the question need not, therefore, be again submitted to them. As this is an error, it is very important it should be at once corrected. No proposition intended to have the effect of sanctioning an alteration of the Bye-laws was submitted to the meeting for their decision,—on the contrary, the Members were told that a Special General Meeting would be convened if it should be thought desirable to take their decision with reference to that question. The subject, although still under the consideration of the Council, and by no means decided upon even there, was referred to in the Annual Report for the purpose of eliciting the opinion of the Members at large with reference to it. This object has already been accomplished to some extent, but we hope to have a further expression of opinion, so as to enable the Council to judge of the probable effect of any change it may be thought desirable to make.

In discussing the subject, it should be clearly understood that no proposition or suggestion has been made to lower the standard of qualification for Members of the Society or registered Pharmaceutical Chemists. In this respect, the tendency is rather in the other direction, as may be inferred from the regulations adopted by the Board of Examiners, and the extensive means provided by the Council for acquiring a complete pharmaceutical education. There is no proposition or suggestion that the terms of admission into the Society should in any way be made more easy than heretofore for those who have entered upon the study of Pharmacy since the passing of the Pharmacy Act. It has, however, been suggested with reference to the payments to be made by those who shall in future be admitted, that some alteration is desirable. The present scale of fees is not found to be equivalent to the annual subscriptions paid by the original Members, and the income of the Society, which is barely equal to the current expenses, cannot be maintained without a considerable increase in the number of Members if the fees remain as at present.

One of our correspondents, Mr. Hornsby, of Bristol, suggests that an annual subscription should be paid "in addition to a *somewhat reduced* admission fee." This is very much the purport of what has been proposed in the Council. Of course such alteration, if made, would not apply to those already admitted, but to future admissions only. The ultimate and permanent income of the Society will obviously depend almost entirely upon the regulations to be made with reference to these payments, and would be but little affected by the admission of established Chemists who were in business before the passing of the Act, and who, if received now, would be on a par, in regard to age and the probable duration of their membership, with the original members of the Society. It has been represented to the Council that there are many highly respectable Chemists of this class, who, seeing the progressive advancement the Society is making, and the important position it has already acquired, are prepared to join its ranks if the means of doing so be presented to them. With this class the passing of an examination is of course out of the question, and as no other

means are at present provided by which they can be admitted, they are either permanently excluded, or some fresh regulation must be made for taking them into membership. It is with reference to this point chiefly that differences of opinion appear to exist, and in coming to a decision upon it several questions arise to which the diligent inquiry and serious consideration of the Members of the Society ought to be directed.

1. Is it desirable, under any circumstances, that the existing regulations with reference to the admission of Members should be disturbed, so as to give the Council the power of admitting Chemists who were in business before the passing of the Pharmacy Act without examination?

It will be readily conceded that a change in this respect may be productive of some evils. The character of the Society has to a great extent been established upon the recognized principle that in future the qualification of all those who are elected Members is to be tested by examination, and any deviation from this principle may, and probably would, have the effect of lowering the Society in public estimation, and of depreciating the value of membership. This effect would be likely to occur, even supposing that all those who should be admitted under the new regulation were in every respect as well qualified as any of the other Members of the Society. They would be unexamined Members, and if any such could be admitted now, the value of the examinations would to some extent be lowered. But if by chance any should be admitted under the new regulation who proved unworthy, the evil would of course be greatly magnified. The proposed change would also be productive of evil, by inducing a belief that further changes in the same direction would follow, rendering admission into the Society more easy and examination less necessary, thus weakening the inducements to pursue the system of study, by which alone a thorough qualification can be acquired. Some young men, instead of taking the trouble and incurring the expense of preparing themselves for examination, would probably be induced to speculate on the chance of their being admitted into the Society at some future time on easy terms, while existing Members might in some instances take offence at the adoption of the measure, and secede from the Society.

But while the change would thus be productive of some evils, these might be more than compensated for by advantages which would result from the new regulations. No one will deny that it is desirable to make the Pharmaceutical Society as complete a representative as possible of the whole body of qualified and respectable Chemists and Druggists. There are, no doubt, many men in different parts of the country who have been long established in business, whose qualifications have been amply tested by the manner in which they have conducted their business, and whose co-operation in carrying out the objects of our Society is much to be desired, but who have not yet joined us. The importance of bringing these men into our ranks is very ably stated by a correspondent, "Opifex," at page 33. We can add nothing to the force of the arguments there adduced in favour of adding to our strength in the way proposed, and we think these arguments would determine the Council and the Members generally in favour of the proposed change in the Bye-laws, if it could be shown that such a change would be likely to result in any considerable accession of new Members from among the class referred to. If, however, the accession of Members should be small in amount, the evils attendant upon the change would probably preponderate over the advantages, and in the prospect of such a result, no one, of course, would promote it. The following question, therefore, very naturally arises here:—

2. Is there such a number of well-qualified Chemists who were in business before the passing of the Pharmacy Act, and *who are now disposed to join the Society*, as would justify the Council in endeavouring to obtain power, by an alteration of the Bye-laws, to admit them into membership without examination?

Several applications have been made to the Council, such as that from Mr. Hornby, of Sheffield, published among the correspondence, and it has also been represented in general terms, that there are many good men ready to join us, but it is desirable to have more specific information with regard to the number of these, and local secretaries and others would do good service to the cause by procuring such information, and sending it to the Council. In the absence of correct data of this kind, it is impossible to form a judicious decision, and it would be unsafe and unwise to take any active steps towards effecting an important, and it may be a critical, change in the constitution of the Society, without having the fullest and the best information that can be obtained, with reference to the probable effect of such a change. Members throughout the country are earnestly requested to aid in furnishing the required information. In towns where there are several Members, meetings should be held, and in any case in which there is no local secretary, the Members should select one of their number to act as such, and recommend him for appointment by the Council.

In endeavouring to ascertain the number of eligible men who would be willing to join the Society, it will be necessary to have some idea of the terms of admission, hence another question arises here, namely :—

3. What are the terms upon which it would be desirable, if at all, to admit to membership without examination ?

It would not, of course, be proposed to give these new men all the advantages of the Society, which have been obtained at the cost of many years of labour, and by the expenditure of large sums of money, without requiring the payment of something more than the annual subscription. It has been suggested that they should pay an entrance fee of five guineas, and the usual annual subscription. This would be about equivalent to the payment of arrears of subscription from the date of the Act, when admission was previously offered them, after deducting the value of the Journals which they will not have received.

What it is especially important to ascertain, then, is, how many old and well established Chemists there are, who were in business before the passing of the Act,—men "of high standing, acquirements, and respectability, who, from various causes, do not belong to us," but who would be willing to join us on the terms above stated. If it should be found that several hundreds of this class could be added to the Society, surely no one would feel aggrieved by such an act, for the interests of all parties concerned would be promoted. We are by no means confident, however, that such a result could be attained. Considering the efforts which on former occasions have been made to bring this class of men into the Society, when their admission would not have entailed the payment of an entrance fee, it is much to be feared that the various causes which have hitherto prevented their belonging to us, would constitute, with the conditions which would now be imposed upon them, a class of obstacles which comparatively few would surmount. If this should appear likely to be the result, it cannot be supposed that the Council or the Members at large would advocate a change which, as such, would engender some evils, and from which no adequate amount of benefit could be reasonably anticipated.

It is of the utmost importance to the Society that a right decision should be arrived at on this question, and we trust the interest which has already been manifested among the Members with reference to it will be maintained and extended, that ample inquiries will be made, and that such information will be furnished to the Council as will enable them to propose a settlement of the measures under consideration, which shall prove satisfactory and conducive to the permanent welfare of the Society.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *5th June*, 1861,

Present—Messrs. Bird, Bottle, Brady, Bucklee, Davenport, Deane, Edwards, Hanbury, Haselden, Hills, Lescher, Meggeson, Morson, Sandford, Savage, Squire, Standring, and Waugh—being the first meeting after the anniversary—the following Officers of the Society were elected:—

PETER SQUIRE .....*President.*
GEORGE WEBB SANDFORD .....*Vice-President.*
DANIEL BELL HANBURY .....*Treasurer.*
ELIAS BREMRIDGE was also re-appointed *Secretary and Registrar.*

The following were appointed on the several Committees:—

General.—Messrs. Bird, Bucklee, Davenport, Deane, Lescher, Hanbury, Haselden, Herring, Hills, Meggeson, Morson, and Waugh.

Finance and House.—Messrs. Bird, Bucklee, Hills, Lescher, and Meggeson.

Library, Museum, and Laboratory.—Messrs. Davenport, Deane, Edwards, Haselden, Hills, Lescher, Meggeson, Morson, and Waugh.

Journal (Finance).—Messrs. Deane, Edwards, Haselden, Morson, and Waugh.

Pharmacopœia Sub-Committee.—Messrs. Davenport, Deane, Haselden, Herring, Hills, Morson, and Waugh.

Board of Examiners (London).—Messrs. *Bird (Augustus), *Cracknell, Davenport, *Darby, Deane, *Garle, *J. B. Edwards, *Daniel Hanbury, and Morson.

Board of Examiners (Edinburgh).—Messrs. *Ainslie, *Aitken, *D. R. Brown, *Flockhart, *Gardner, *Kemp, *Robertson, *Tait, and Mackay.

The President and Vice-President, *ex officio*, on all Committees, and on the respective Boards of Examiners, London and Edinburgh.

LIST OF MEMBERS, ASSOCIATES, AND APPRENTICES (*continued*).

Elected in June.

MEMBERS.

BOMBAY .....Kemp, David Skinner
HULL .....Earle, Francis
NEWCASTLE-ON-TYNE .....Dunn, James
PRESTON.....Metcalfe, John Sykes

MAJOR EXAMINATION.

Bartlett, James .....Bath
Buzzard, Thomas Hardy.....Spilsby
Edwards, William.....Much Wenlock
Laurens, Frederick Lemprière .....Jersey

MINOR EXAMINATION.

Baker, Thomas .....Blandford
Barnitt, John.....Leeds
Bell, James Alfred .....Brighton
Pritchard, George Frederick .....Knightsbridge
Waites, Edward W. .....Ross
Wills, Douglas .....Lewisham

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* Not Members of the present Council.

REGISTERED APPRENTICES.

NAME.	RESIDING WITH.	ADDRESS.
Beattie, James	Mr. Gordelier	Sittingbourne
Bulgin, William	Mr. Groves	Blandford
Copland, Herbert	Mr. Anthony	Bedford
Curtis, William	Mr. Marks	Bradford-on-Avon
Hooper, Leonard	Mr. Hooper	43, King William Street, City
Jones, Richard Edward	Mr. Jones	Carmarthen
Ludgater, Alfred	Mr. Gordelier	Sittingbourne
Thomas, John Ashlin	Mr. Coupland	Harrogate

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Twelfth General Meeting was held on the 11th of April, 1861,

THE PRESIDENT IN THE CHAIR.

Mr. Joseph Snape was elected a member of the Association.

The Secretary announced the donation to the Library of the *Pharmaceutical Journal*, from the Society; and the *Technologist*, No. 9, from the Editor.

The President read the award of the Laboratory Prize for the session just closed. The successful competitor was Mr. Henry Bird, who will receive the prize at the Annual Meeting.

Mr. J. Abraham then proceeded to read a paper "On the Chemistry of Vegetation;" at the close of which he received the thanks of the meeting for his interesting communication.

The Thirteenth General Meeting was held on the 25th of April, 1861,

THE PRESIDENT IN THE CHAIR.

The Secretary announced the donation to the Library of the *Chemist and Druggist*, from the Editor; and to the Museum, of specimens of Scammony Root and of Anacahuite Wood, and a valuable series of printed Museum Labels, from Mr. H. S. Evans; also 1000 large blank Labels, from Messrs. Fearnall and Co.

Mr. Evans made some remarks on the Anacahuite Wood, which, he stated, was used by the Indians in Mexico for diseases of the lungs, and was said to be, in their hands, a very successful remedy for such cases. There is now a considerable quantity of the wood in Liverpool, and he should be happy to supply it to any medical gentleman who might wish to ascertain the real medicinal value of the new drug, which, if it should prove to possess all, or only a portion of the important properties attributed to it, will prove a very valuable addition to our Materia Medica.

The Chairman explained the construction of the Binocular Microscope, one of which he had placed upon the table, in order that the members might have an opportunity of seeing the wonderful and beautiful effect produced by this great improvement in the instrument, by far the most important made in it during the last ten years. The difference between the appearance of an ordinary stereoscopic picture placed on the table, and the same picture seen in the stereoscope, is not greater than between an object seen by one eye under the ordinary microscope as a flat body, and the same object as seen in relief by both eyes under the binocular microscope.

Mr. H. S. Evans then delivered a lecture "On the Chemistry of Ventilation," illustrated by experiments. The composition of the air, the changes constantly taking place in it from vegetation, combustion, respiration, and other causes, and the importance of a large and constant supply of pure air to the health of animals, were pointed out. The various plans that have been adopted for securing the expulsion of the deteriorated atmosphere within doors, and the regular substitution of a pure supply, were

explained, and their several advantages and disadvantages brought forward. At the conclusion of the lecture, it was resolved, on the suggestion of the Secretary, that the next meeting should be devoted to the discussion of the vitally important subject brought before them by Mr. Evans, to whom a vote of thanks was awarded for his able lecture.

Fourteenth General Meeting, on the 9th of May, 1861,

THE PRESIDENT IN THE CHAIR.

Mr. N. MERCER exhibited a number of Gas Furnaces intended for the production of heat in laboratories, and explained their construction and mode of action. Dr. Nevins exhibited a specimen of Actæa Root, and described its medicinal uses and effects. He also spoke of the supposed value of Permanganate of Potash as a disinfectant, and said that, as a test of the purity of the atmosphere, his own experience led him to the conclusion that it could not be depended upon.

A discussion on Ventilation occupied the remainder of the evening. Dr. Nevins exhibited a model of a sick-room and the means of ventilating it, in explanation of his views on the subject. Mr. Mercer, Mr. G. Barber, Mr. J. Shaw, Dr. Edwards, the Secretary, and other gentlemen, took part in the discussion, which was of a highly interesting character.

The Fifteenth General Meeting, May 23, 1861,

MR. N. MERCER IN THE CHAIR.

The SECRETARY announced Donations to the Library of *The Chemist and Druggist* from the Editor ; *The New York Journal of Materia Medica*, from Messrs. Morgan, London ; and *A Catalogue of Books* published in Liverpool previous to 1851.

He also announced the formation of a class for the study of Botany by Messrs. Marrat and Fisher, which meets in the Royal Institution once a week, and to which Members and Associates of this Society, by the kindness of those gentlemen, are admitted on very reasonable terms, thus affording a very favourable opportunity for acquiring some valuable practical knowledge of a science which is of the highest importance to the Pharmaceutist.

Mr. W. Whitthread read a paper "On Volumetrical Analysis," with special reference to the determination of the alkali in black and white ash.

ORIGINAL AND EXTRACTED ARTICLES.

NOTES ON CHINESE MATERIA MEDICA.

BY DANIEL HANBURY, F.L.S.

(*Continued from page* 557.)

大海子 *Ta-hai-tsze ;* Fruits of *Erioglossum ?* or *Nephelium ?* (*Sapindaceæ*) ; *Boa-tam-paijang,* Guibourt, *Hist. des Drogues,* tome iii., page 543 ; *Bungtalai* (otherwise written *Poung-ta-rai*) of the Siamese.

This fruit is of some interest as having been introduced into France about twenty years ago as a certain specific in diarrhœa and dysentery. Its claims to this character, which were tested in the Hôpital Beaujon in Paris, did not however hold good, no results being obtained from its use, but such as were attributable to the effect of repose, diet, and a mucilaginous beverage. But the drug had the merit of an unknown origin, a barbarous name, and a very high price,* and notwithstanding the unfavourable report made upon it by those officially appointed to give it a trial, it continued for some time to be prescribed.

Boa-tam-paijang, for such is the name under which it was introduced into Europe, though in Bangkok, whence I have received specimens, it is better

* In the wholesale price list of MM. Menier, druggists, of Paris (1854), it is quoted at 200 francs per kilogramme, *i. e.* £3 13*s.* per lb.

known as *Bungtalai*, is produced in Cambodia, from a tree which has not at present been botanically determined. Sir Robert H. Schomburgk, British Consul at Bangkok, succeeded in obtaining fresh seeds, which germinated, but the young plants thus raised perished before attaining maturity. The leaves which Sir Robert sent me are about 5 inches long, *simple*, entire, oblong or ovate, acuminate, rounded or subcordate at the base, and perfectly glabrous on both sides. The fruits, as found in commerce (fig. 4), are from $\frac{3}{4}$ to $1\frac{1}{4}$ inches long, ovoid, usually somewhat elongated at the lower extremity, which terminates by a large oblique cicatrix. Externally they are of a dark brown, deeply wrinkled, though generally less so at the superior extremity. The pericarp, which is from $\frac{1}{10}$ to $\frac{1}{20}$ of an inch in thickness, consists of a thin epidermis, beneath which lies a dry, black, resinous-looking pulp, surrounding a fragile shell lined with a whitish membrane (the testa of the seed ?). The central part of the fruit is occupied by two cotyledons, which in their dried and shrunken state are thin and concave: the radicle is inferior, very short and turbinate. When the fruit is macerated in water, its outer shell or pericarp increases enormously in volume, forming a large gelatinous mass.* It is this mucilaginous property that confers a value on the fruit in the eyes of the inhabitants of China and Siam, in both which countries the jelly is sweetened and eaten as a delicacy.

FIG. 4. (The right hand figure represents a fruit cut longitudinally.)

Boa-tam-paijang has been analyzed by Professor Guibourt, and found to consist of the following substances:—

In the pericarp.		
Green oil	1.06	
Bassorine	59.04	
Brown astringent matter, Mucilage	1.60	64.90
Woody fibre and epidermis	3.20	
In the nucleus.		
Fatty matter	2.98	
Saline and bitter extract	0.21	35.10
Starch, Cellular tissue	31.91	
		100.00

槐實 *Hwae-shĭh;* Legumes of *Sophora Japonica* L. (*Leguminosæ*).

Sophora japonica is a tree of very common occurrence in China and Japan, and not unfrequent in the gardens of Europe. Its flowers called *Hwae-hwa* are largely used in China for dyeing yellow, or rather for rendering blue cotton green,† and the legumes are said by Enlicher to have a similar application.‡

* Sir R. H. Schomburgk has been told that where the trees grow by a road-side, their fruits sometimes drop to the ground so abundantly, that if they become wetted with rain, such a mass of glutinous jelly is formed as to render the passage of the road on foot or horseback a matter of difficulty.

† Martius on *Wai-fa*, the flower-buds of *Sophora Japonica*. *Pharm. Journ.*, Aug., 1854, p. 64.

‡ *Enchiridion Botanicum*, p. 677.

These latter, in the dried state, are from 1 to 4 inches long by $\frac{3}{10}$ to $\frac{4}{10}$ of an inch wide, wrinkled, fleshy, semi-transparent, more or less contracted between the seeds, which usually do not number more than six in each legume.

皂角 *Tsaou-keŏ;* Legumes of *Gleditschia Sinensis* Lam., *Mimosa fera* Lour. (*Leguminosæ*); Tatarinov, *Catal. Med. Sin.*, p. 57.

The valves of the broad, flat pods are regarded, according to Loureiro, as attenuant, stimulant, and purgative. They are also lauded for their effects in the removal of phlegm and other viscid humours, and in the form of a sternutatory or suppository are said to be peculiarly efficacious in apoplexy, hemiplegia, and paralysis.

補骨脂 *Poo-kwŭh-che;* Legumes of *Psoralea corylifolia* L. (*Leguminosæ*); *Pun-tsaou*, fig. 177.

These are flat, oval or reniform, black, one-seeded legumes, which being very small and indehiscent may readily be mistaken for seeds; they are about two lines long, and are sometimes surrounded by the calyx, which is 5-lobed and marked with prominent nerves. The fruits of this *Psoralea* have an aromatic flavour, and are used in India (of which country the plant is a native) as a stomachic, as well as in certain inveterate cutaneous diseases.*

肥皂莢 *Fe-tsaou-tow; Dialium* sp.? (*Leguminosæ*).

These are smooth, black seeds (fig. 5), $\frac{3}{4}$ of an inch in diameter, of a compressed spherical form, each furnished (when perfect) with a large, regid, persistent podosperm. A transverse section shows a pair of plane cotyledons, between the flat sides of which and the thick and hard testa, lies a layer of black, horny albumen.

FIG. 5. (The figure in the centre shows the transverse section of a seed slightly magnified.)

Of the origin and application of this drug I have no information.

枳椇子 *Che-keu-tsze;* Fruits of *Hovenia dulcis* Thunb. (*Rhamneæ*); *Sicku* Kæmpfer, *Amœn.* 808, 9; *Pun-tsaou*, fig. 684.

The curiously-contorted, fleshy, fruit-bearing peduncle is edible, and said to have the flavour of pears. It is used in China and Japan to diminish the effects of an excess of wine.

海金砂 *Hae-kin-sha;* Spores of a Fern (*Filices*); *Pun-tsaou*, fig. 325; Cleyer, *Med. simp.* No. 173.

A light, mobile, rufous-brown powder, which, when thrown into the air and ignited, burns like lycopodium, for which substance it might be substituted.

枳殼 *Che-kŭh;* Dried Fruits of *Citrus fusca* Lour. (*Aurantiaceæ*), *Flor. Cochinch.* ed. Willd. 571.

My specimen of this drug consists of the fruit cut into halves and dried; in this state it forms circular discs of from 1 to 2 inches in diameter, nearly flat on the cut side, convex on the exterior. The peel is firm and excessively

* Ainslie, *Mat. Indica*, vol. ii., p. 141.

thick, being about half the diameter of the dried pulp: externally it is rough and of a deep blackish-brown, internally of pale buff. It is bitter and agreeably aromatic.

Loureiro states that *Citrus fusca* is widely diffused in Cochin China, but less common in China. He adds that the entire peel of the fruit is considered attenuent, deobstruent, and mildly cathartic.

The zest of a thick-skinned orange or citron dried in very thin slices, is found in the Chinese drug shops under the name of 橘白 *Keŭh-pih.*

青皮 *Tsing-pe;* Immature Fruits of *Citrus* ——? (*Aurantiaceæ*); *Cin-pi,* Tatarinov, *Catal. Med. Sinens.*, p. 12.

In Tatarinov's Catalogue, these fruits are referred to *Citrus microcarpa,* Bge., a plant which Professor Bunge describes as "*frutex in caldariis Pekinensibus frequens, fructu maturo mense Januario et Februario onustus.*"* I do not know what further range this plant may have, but if it is only cultivated on a small scale with artificial heat, it can hardly be the source of a common drug like that under notice: I think it best therefore to leave the species of *Citrus* undefined.

The fruits called *Tsing-pe* are from $\frac{4}{8}$ to $\frac{5}{8}$ of an inch in diameter, and resemble the *Baccæ Aurantii* of European pharmacy, except that the latter have a somewhat less rough exterior.

馬兜鈴 *Ma-tow-ling;* Fruits of *Aristolochia Kæmpferi* Willd., *Sp. Plant.* VI., pars i., p. 152 (*Aristolochieæ*); Hoffmann et Schultes, *Journ. Asiatique,* Oct., Nov., 1852, p. 275; *Kæmpf. Icones,* tab. 49; *Pun-tsaou,* fig. 388.

Oval fruits of 1 to $1\frac{3}{4}$ inches in length, formed of six thin and papery valves, enclosing large, flat, obtusely-triangular, winged seeds. Each fruit is supported on a pedicel at least as long as itself.

In Tatarinov's Catalogue the name *Ma-tow-ling* is referred to *A. contorta* Bunge, an identification I have not been able to confirm, though I have had the kind assistance of Professor Bunge. *A. contorta* is found in the neighbourhood of Pekin, and occurs also in the Amoor country.

菟絲子 *Too-sze-tsze;* Seeds of *Cuscuta europæa* L. (*C. major* Bauh.) (*Convolvulaceæ*); *Pun-tsaou,* fig. 379; *Tú sū çù,* Cleyer, *Med. simp.* No. 9; *Tu-sy-tsy,* Tatarinov, *Catal. Med. Sinens.*, p. 61.

Roundish seeds of a light brown colour, about the size of black mustard. The long filiform embryo, spirally rolled round the fleshy albumen, which is characteristic of the genus *Cuscuta,* may be readily seen if a seed be soaked in water and its testa then removed.

For the species of *Cuscuta* to which these seeds are referred, I adopt the authority of MM. Hoffmann and Schultes;† but although *C. europæa* is found in Japan, and probably occurs in China also, there is another species, *C. chinensis* Lam., the seeds of which I find to be extremely similar, so that it is very likely they may pass under the same native name. I am not aware what virtues are ascribed by the Chinese to this drug. The entire plant (*Herba Cuscutæ majoris*) was formerly officinal in Europe as a purgative.

蓮子 *Lien-tsze;* Nuts of *Nelumbium speciosum* Willd. (*Nelumbiaceæ*); *Pun-tsaou,* fig. 703.

These nuts, which in shape and size resemble small acorns, are produced by the well-known Nelumbrium or Egyptian Bean, called in China *Water Lily,* a plant extensively cultivated both in that country and in India, as well for its ornamental flowers as for its various useful properties. The nuts

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* *Mémoires présentés à l'Académie Impériale des Sciences de St. Pétersbourg,* tome 2 (1835), p. 84.

† *Journal Asiatique,* Oct., Nov., 1852, p. 288.

have a farinaceous kernel, which, when boiled or roasted, is good to eat. The thick fleshy rhizome is likewise edible when cooked; the starch which it contains, separated by rasping and washing, constitutes a sort of arrowroot, called by the Chinese 藕粉 *Gaou-fun.*

菱 *Ling;* Fruits of *Trapa bicornis* L. (*Halorageæ*); *Pun-tsaou*, fig. 704.

The plant is abundant on canals and shallow lakes, from the surface of which its singular fruits (fig. 6) are collected in immense quantities, on account of their kernels, which, when roasted, are edible.

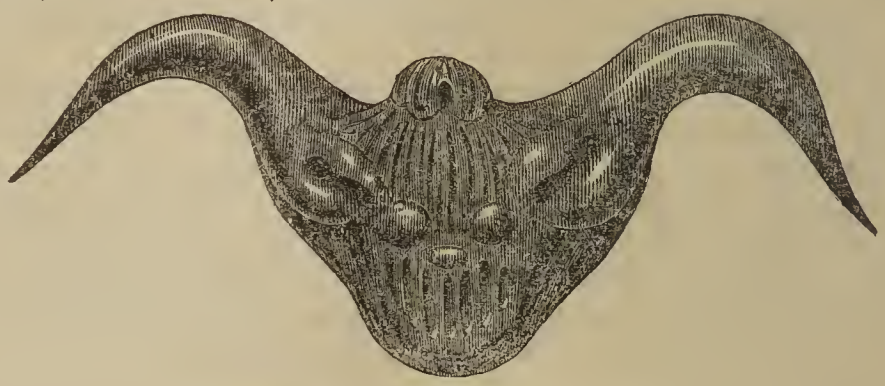

Fig. 6.

梔子 *Che-tsze;* 山梔 *Shan-che;* Dried Fruits of two or more species of *Gardenia* (*Rubiaceæ*); Che-tsze, *Pun-tsaou*, fig. 783; Czzi-tsy (Che-tsze), *Fructus Gardenia floridæ*, Tatarinov, *Cat. Med. Sinens.*, p. 17.

Under the above Chinese names (otherwise spelt *Chan-tchi* and *Tchi-tse*) I have received the dried fruits of two species of *Gardenia.*

The larger (fig. 7), called *Che-tsze*, occurs as a smooth, oblong, orange-brown, imperfectly two-celled berry, of from $1\frac{1}{4}$ to 2 inches in length, crowned with the remains of the calyx, which are prolonged down the sides of the fruit in six prominent ribs. The pericarp is fragile and horny, marked internally by two narrow projecting receptacles. The seeds are numerous and imbedded in a dark orange pulp.

Dr. T. W. C. Martius has presented me with specimens of this fruit under the name of "*Wongshy*" (*Whang-che* 黃梔), and refers it to *Gardenia radicans* Thunb.

Fig. 7.

The smaller fruit (fig. 8) called *Shan-che*, is from $\frac{8}{10}$ to $\frac{1}{2}$ an inch in length, of an ovoid form, smooth, six-ribbed, furnished on the inner surface of the pericarp with two narrow wing-like receptacles opposite each other. The seeds are nidulant in an orange pulp.

The precise species of *Gardenia* affording each of these fruits is not yet clearly made out. There appear to be at least three plants, whose fruits are used on account of their colouring properties. These are:—

1. *Gardenia florida* L., a large, very ramous shrub, native of Japan, China, India, &c. Major Champion found it in abundance in several localities in Hong Kong.* Mr. Fortune has informed

Fig. 8.

* *Hooker's Journ. of Bot.*, vol. iv. (1852), p. 193.

me that it is common in the hilly districts at some distance from Shanghai, and that its fruit is collected for dyeing purposes, but not produced so abundantly as that of *G. radicans*.

2. *Gardenia radicans* Thunb., a much smaller plant than *G. florida*, with a decumbent rooting stem. It is native of Japan, China, India, &c. Mr. Fortune has given me its Chinese name as *Whang-tsze*, and stated that its fruit is commonly collected in the north of China for its colouring properties.

3. *Gardenia grandiflora* Lour., a native of Cochin China. Loureiro mentions that its fruits impart a beautiful colour to silk, and that they are also used medicinally in decoction, in fevers and in a variety of other complaints.*

The fruits of these Chinese Gardenias (which are so similar in properties that the analysis of one will probably serve for the other two) have been examined by several chemists, among whom, as the most recent, may be mentioned Mr. Lorenz Mayer, of the laboratory of Professor Rochleder, of Prague. According to the investigations of this gentleman,† the splendid yellow colour of the *Gardenia* is due to a body named *Crocine*, which appears to be identical with the polychroite of saffron. Crocine is uncrystallizable; when in powder it is of a bright red colour; it dissolves readily in water or alcohol, its solution possessing the colour of chromic acid. Salts of lead give orange-red precipitates with a solution of crocine; if a concentrated aqueous solution be treated with sulphuric acid, the mixture assumes an indigo-blue colour, which changes to violet. By the decomposition of Crocine, a body called *Crocetine* is obtained. The composition of Crocine is $(2\ C_{58}\ H_{42}\ O_{30}) + HO$; that of Crocetine, $C_{42}\ H_{23}\ O_{11}$.

(*To be continued.*)

ON THE COLOUR-TESTS FOR STRYCHNIA, AND THE DIAGNOSIS OF THE ALKALOIDS.

Being the substance of part of the Croonian Lectures for 1861, *delivered at the Royal College of Physicians.*

BY WILLIAM A. GUY, M.B., CANTAB.,
Fellow of the College, and Professor of Forensic Medicine, King's College, London.

(*Continued from page* 606.)

I NOW proceed to discuss the third of the four questions propounded in my first communication, namely, Are the colour-tests, or is the selected test, open to any serious objection?

Of chemical tests in general, it may be said that they are more or less liable to the following objections or disparagements:—1. They may be wanting in delicacy; that is to say, they may not be able to detect minute quantities of the substances to which they are applied as tests. 2. They may be wanting in certainty; in other words, they may fail from slight causes difficult to appreciate and define, such as the quantity or proportion in which they are applied, or the strength of their solutions if used in the form of liquid. 3. They may give rise to transient effects, or to appearances difficult to describe or define. 4. They may be unusually liable to failure from impurities in themselves, or in the matters to which they are applied as tests. And, lastly, they may produce of themselves appearances nearly allied to those which they occasion when added to the matters under examination.

From the first of these objections all the colour-tests for strychnia are certainly free. They are able to detect very minute quantities of the poison.

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* *Flor. Cochinch.*, p. 183.

† On the Yellow Colouring Matter of the Fruit of *Gardenia grandiflora*, by F. Rochleder. *Chemical Gazette*, Sept. 1, 1858, p. 331. *Pharm. Journ. and Trans.*, vol. xviii. (1859), p. 626.

From the fourth objection, too, as it will presently be shown, they are at least as free as the majority of chemical tests. To the second, third, and last objections they are certainly exposed, but under what circumstances and in what degree, it will be necessary to inquire.

The occasional failure of the colour-tests for strychnia from slight and obscure causes is not to be denied. It is proved by the experiments already detailed, and is admitted by all experienced chemists. But it should be understood that this objection has only a limited application. It goes only to the extent of impairing the value of the evidence derived from a negative result. If the colour-tests fail when applied to a spot acted on by sulphuric acid, their failure is not conclusive evidence of the absence of the poison. It affords a strong probability of such absence, but nothing more.

The reactions of the colour-tests for strychnia are certainly transient. They are not like the permanent white, crystalline, or coloured precipitates afforded by most chemical tests. But the objection on this ground is also of limited application. In experiments with the colour-tests made in the manner described in a former communication, we obtain two classes of results. We may get a mere trace or "flash" of blue, or we may obtain a deep rich blue colour, lasting for several seconds, for half a minute, or even for forty-five seconds, and succeeded by the other tints already described. Now those who maintain the value of the colour-tests for strychnia do not pretend that a mere flash of colour affords such evidence of the presence of strychnia as could be used with safety in a court of law; but they would probably be found to assert with equal confidence that a deep rich blue colour, developed by the colour-producing tests for strychnia, and continuing for several seconds in a spot previously treated with sulphuric acid without change of colour, and then succeeded by other colours, affords good evidence of the presence of strychnia. Though the blue colour soon passes away, there is ample time afforded for its complete recognition.

In answer to the objection that the succession of colours is difficult to describe or define, it will suffice to state that though it may not be possible by any words that we can use to describe the successive colours developed by the colour-tests, it is not necessary to do so. For the first deep rich blue colour, characterized by the property of want of permanence, is in itself so remarkable as to constitute a most valuable and trustworthy test for strychnia.

The colour-tests for strychnia are certainly open to the objection that the colour-developing substances are themselves coloured. The peroxide of lead is puce coloured, the peroxide of manganese black, the bichromate of potash orange coloured, the ferricyanide of potassium yellow or orange, and the permanganate of potash lilac. The peroxide of lead and the peroxide of manganese also colour sulphuric acid by admixture, and the bichromate of potash, ferricyanide of potassium, and permanganate of potash change the colour of the acid by solution. But it has been shown that the colours thus produced cannot possibly be confounded with the strychnia blue, and consequently form no valid ground of objection.

The fourth of the five objections applicable to chemical tests in general, certainly does not apply with any force to the colour-tests for strychnia; for I can state as the result of experiments with a great variety of substances, vegetable and animal, including all the matters that are likely to remain mixed with strychnia after its extraction from the contents of the stomach, or from the fluids and tissues of the body, and further with many mineral substances, including common salt, arsenious acid, tartar emetic, and corrosive sublimate—all these animal, vegetable, and mineral substances having been added in quantities far exceeding those in which they could possibly exist as impurities in strychnia extracted from the contents of the stomach, or from the fluids and

tissues of the body—that the colour-tests are little, if at all, affected by such admixtures. This observation applies to the permanganate of potash equally with the bichromate of potash.

For practical purposes the reaction which demonstrates the presence of strychnia may be described as a clear rich blue colour, developed by the colour-tests in a spot previously treated by strong sulphuric acid without change of colour, the blue colour in question lasting long enough for perfect recognition, and then passing into other colours. In the absence of the blue colour we can affirm the probable absence of strychnia, but a mere flash of colour does not afford a degree of evidence upon which we ought to rely in a medico-legal inquiry.

Assuming the description just given to be correct, I now proceed to inquire whether there are any known substances which give rise to a similar reaction. The answer must be, in a qualified sense, in the affirmative; but it must be understood that the reaction is only *similar*, not the *same*.

Such a substance is to be found in cod-liver oil, which, when treated with strong sulphuric acid, assumes a purple tint, mixed with streaks of blue, changing after a time to mulberry, and from that to a red-brown. In these changes of colour there is such a general resemblance to the strychnia tints as would justify their being put forward as an objection to the colour-tests, but for the very obvious consideration that with sulphuric acid alone strychnia undergoes no change of colour. The very fact, too, that cod-liver oil is an oil, while strychnia is tested either as an alkaloid or the salt of an alkaloid, as a crystal or as a white powder, or as a dry deposit from a liquid holding it in solution, deprives this objection to the colour-tests for strychnia of all practical value.

Again, aniline is mentioned as a source of fallacy. But aniline is a coloured liquid, which yields with sulphuric acid a dense white precipitate, the sulphate of aniline. Strychnia, on the other hand, is a crystal or white powder, or a dry deposit from a liquid holding it in solution.

But the sulphate of aniline which is formed by adding the strong sulphuric acid to the liquid aniline, is sold as a white powder, as are some specimens of strychnia. Hence the sulphate of aniline might possibly prove a source of fallacy, inasmuch as it gives no change of colour with sulphuric acid, and yet when treated with the colour-producing substances, yields a colour similar to the blue of strychnia. But the sulphate of aniline, in place of a rich deep blue passing speedily into mulberry and at length into bright red, assumes at first a pale green, which deepens by slow degrees, then passes into a beautiful blue, continuing unchanged for a long period, but at length turning to a black. So that the first characteristic colour with strychnia is the second with aniline, and the transient colour with strychnia is persistent with aniline.

Again, there is a red crystalline substance, pyroxanthine, which produces with sulphuric acid alone, without addition of the colour-producing tests, a blue similar to that produced by strychnia. But there is here no real fallacy, because strychnia is not coloured, and does not yield any colour with sulphuric acid alone.

Nor do papaverine and narceine, which are tinged purple by sulphuric acid alone, create any difficulty, or occasion any fallacy. And the same may be said of the whole body of alkaloids and active principles, whether coloured or colourless, which yield colours when treated with sulphuric acid alone. Of those which resemble strychnia in giving no colour with sulphuric acid, it may be stated with equal confidence, that not one of them yields with the colour-developing substances the true strychnia colours, or any colours resembling them.

The foregoing are given as examples of the sort of objections that are urged

against the colour-tests for strychnia. They belong to the class of objections which no one out of a court of law would bring forward as worthy of serious attention. They are based, not so much on a misapprehension of the facts, as on an illogical comparison of dissimilar phenomena. But there is one objection founded on a misapprehension and quite unintentional misrepresentation, which ought not to be passed over in silence. It is stated by Dr. Taylor, in his work on Poisons, that the alkaloid curarina obtained from the South American poison curara "resembles strychnia in the action of the colour-tests, brucia in the action of nitric acid, and both in its intense bitterness." These are the words used by Dr. Taylor, at p. 786 of the second edition of his work; and on referring to p. 772, he says of the same alkaloid, that "strong nitric acid produces with it a blood-red colour; sulphuric acid gives with it a rich carmine tint, in which characters it resembles brucia," and further that Pelikan found pure curarina to possess the chemical properties of strychnia, so far as the colour-tests are concerned, and with more constant results. Thus sulphuric acid when conjoined with the action of chromate of potash, ferricyanide of potassium, or peroxide of lead, "produced a beautiful play of colours," and that "the galvanic test acted similarly." Now, on referring to the passage cited from Pelikan, I find that this beautiful play of colours is a translation of the words "des colorations rouges très belles," and "la coloration rouge," the one expression being applied to the chemical tests, the other to the galvanic test. So that the alkaloid curarina is set up as a fallacy on the strength of its yielding with the colour-tests (sulphuric acid mixed with chromate of potash, ferricyanide of potassium, or peroxide of lead) a brilliant red colour, or colours, instead of the beautiful play of colours, blue, mulberry, and red, which jointly, and not separately, characterize strychnia. If any one colour is to be deemed the strychnia colour *par excellence*, it is the rich, deep blue, and not the brilliant red. Let it also be remembered that sulphuric acid gives with curarina, according to Bernard, a rich carmine tint, while strychnia undergoes no change of colour when treated with sulphuric acid. The statement made by Dr. Taylor that in giving a blood-red colour with strong nitric acid and a rich carmine tint with sulphuric acid, curarina resembles brucia, is evidently founded in error. The reaction of brucia with nitric acid is correctly stated, but brucia certainly does not yield a carmine tint with sulphuric acid. It is one of the list of substances grouped together in my tables as characterized by a negative action with sulphuric acid; and Mr. Jenkins, in the table which I sent round in my last lecture, attributes to it a negative reaction with sulphuric acid (see *Chemical News*, Oct. 6, 1860); and here I may observe that it is one of the obvious advantages of tables such as these, that they place before us the common and familiar reactions of the substances which they comprise, in such an orderly and methodical way as greatly to assist the memory, and to guard against such inadvertent statements as this of Dr. Taylor's respecting brucia.*

On referring to the tests for brucia itself, as given at page 801 of Dr. Taylor's work on Poisons from which I have been quoting, I find it stated that "strong sulphuric acid colours brucia of a rich rose-pink colour." This colour differs widely from the rich carmine (*belle teinte carminée*) of Bernard, said by Dr. Taylor to be characteristic of the same reaction, and I think that I may venture to state of it that it is not the reaction of pure brucia with pure sulphuric acid. Indeed, it is not the reaction of specimens of brucia of ordinary purity with specimens of sulphuric acid of similar purity. To obtain a rich rose pink with brucia, we must use a specimen of sulphuric acid containing an unusual quantity of nitric acid, and I have no doubt that the unintentional use of such an acid gave rise to this misapprehension. I may add, that to specimens of brucia of fair average

* These tables will be referred to more particularly in my next paper.

quality, sulphuric acid will impart a very slight tint (rose colour or buff), and a still slighter tint to the solution of the alkaloid in the acid. But a rich rose-pink colour is an evidence of the presence of nitric acid, and is readily developed in the solution of the alkaloid in sulphuric acid by a short exposure to the vapour of nitric acid.

I could not have accomplished the object I have in view of vindicating the colour-tests for strychnia from unfounded objections, without tracing this particular objection to its true source. It was necessary to show that the reactions of the rare alkaloid, *curarina*, differ essentially from those of strychnia, and of brucia, which is associated with strychnine in more than one of the plants that yield it; and I could not do this without showing that an esteemed medico-legal authority had made a mistake in reference to a reaction, and an oversight in rendering the words of a French author.

I may add, that on comparing the extract of nux vomica with a specimen of curara poison, for which I am indebted to the kindness of Mr. Morson, and with the brown powder scraped from an arrow tipped with the same poison, and forming one of a collection kindly presented to me by Mr. Stone, of the College of Surgeons, I find no resemblance between the one extract and the other, except in the property of intense bitterness. The woorara poison imparts to strong sulphuric acid a greenish-brown tint, and the nux vomica a pink colour; while strong nitric acid, which turns the first to a pale, dirty yellow, changes the second to a very distinct orange colour. The addition to the solution in sulphuric acid of bichromate of potash produces less effect on the colour of the curara than takes place with the extract of nux vomica. If the woorara really contained any alkaloid capable of developing with sulphuric and nitric acids the deep rich colours attributed to it, I think that some approach to those colours might be expected in the extract itself.

I may conclude this part of my subject by expressing my firm conviction that to the colour-tests applied in the manner I have recommended, there is no valid logical objection; and that though a negative result is not conclusive of the absence of strychnia, a positive result (by which I must be understood to mean the development of a rich blue colour on stirring the colour-developing substances into a spot first treated with sulphuric acid without change of colour, the rich blue colour in question passing, after a few seconds, into other colours) affords undeniable proof of its presence.

In my next, and last communication, I shall endeavour to discriminate the principal alkaloids from each other, and to represent the differences between them by convenient tabular forms.

(*To be continued.*)

ON RICINUS INERMIS, *MILL.*

(*Var. Manchuriensis.*)

BY W. F. DANIELL, M.D., F.L.S., ETC.

The castor-oil plant appears to be indigenous to most parts of the Chinese empire. In the southern provinces it is perennial and arborescent, while in the north it becomes annual or biennial, but more herbaceous and restricted in growth. Two kinds are found indigenous to the maritime districts of Talie-whan, in southern Manchuria, both seldom exceeding two, or two and a half feet in height, having thickly branched, purplish pruinose stems, abbreviated fruit racemes, long-stalked glaucous capsules, comparatively few in number, with six or eight lobed peltato-palmate leaves, supported on light purple petioles. These plants were distinguished by the character of the fruit, the capsules of the ordinary species being densely covered with spines, while those of the other were

more pruinose, smooth, and entirely destitute of them. The variegated and beautifully-marbled testæ of the seeds presented no specific deviation, the fleshy strophiola, however, surmounting the hilum was well marked and rather prominently developed. In some instances these species or varieties were noticed growing together; in others, distinctly separated in isolated patches or groups adjoining the gardens of the native villages. This latter circumstance first directed my attention to their distinctive character. Miller, in his *Gardeners' Dictionary*,* enumerates seven species of *Ricinus*, one of which he describes under the name of *Ricinus inermis*, with "*foliis peltatis serratis, lobis maximus, caule geniculato, capsulis inermibus*," the specific difference of whose fruit from all other kinds renders it closely allied to the Manchurian plant. He also remarks that the seeds of this *Ricinus* were obtained from the Spanish West Indies, and having found that the smooth capsules belonging to the plant were of a permanent character, considered this distinction would suffice to constitute it a new species. His title will therefore equally serve to recognize this among the other Chinese varieties of *Ricinus* at present known. The Manchurian plants flower in June and July, and their fruit attains maturity in October. Their cultivation apparently was not much encouraged by the inhabitants of Talie-whan. On the outskirts, however, of the hamlets and houses along the road leading from Tient-sin to Pekin, the ordinary kind was abundantly reared, and therefore somewhat common. Their general production was promoted merely for the oil the seeds afforded, the villagers employing it chiefly to supply their lamps, and not for dietetic purposes, as had hitherto been frequently represented. The remedial appliances were limited to external embrocations, in pains of the abdomen, muscular rheumatism, and other analogous affections, prevalent amongst the poorer classes of the people. Although the purgative effects of the seeds and oil, were doubtless fully understood, yet the inducements for their use, were not of such value as to permit of their internal administration. It is remarkable how nearly these appliances approximate to those of the ancient Egyptians, mentioned by Strabo, with reference to this product. He observes the castor-oil bean was known in Egypt under the designation of *Kiki*, and that an oil expressed from it, "was used for lamps almost generally throughout the country, but for anointing the body, only by the poorer sort of people and labourers, both men and women."†

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

The Production of Alizarin from Napthalin.—M. Z. Roussin has communicated to the French Academy a process for the conversion of napthalin into alizarin. This result, if really practicable, will prove of considerable importance. Napthalin is produced in large quantities in the manufacture of gas, and has hitherto been nothing more than a waste product; its conversion, therefore, into so valuable an agent as alizarin, will form an important addition to the list of discoveries which have recently added so much to the resources of the dyer.

That some connexion exists between the alizarin and the napthalic series of bodies, has been recognized by chemists, and the probability of the conversion has, we believe, tempted more than one experimenter.

M. Roussin's process consists in making a mixture of binitro-napthalin and concentrated sulphuric acid in a large porcelain dish heated by a sand bath. As the temperature rises, the binitro-napthalin dissolves completely in the acid, forming

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* Art. *Ricinus*. *Ed.* 8, 1768.

† *Geo.*, *bib.* xvii., *k.* 2—5. *Bohn's ed.*

an amber coloured solution. When the mixture is at 200° Cent. some finely granulated zinc is added. In a few instants an evolution of sulphurous acid takes place, and in half an hour the operation is completed. If a drop or two of the acid liquid be now thrown into cold water, a deep red violet colour is developed, owing to the formation of alizarin. It is important in operating upon any large quantity of materials, to add the zinc in small successive portions, and to take care that the temperature of the acid liquid does not exceed the point indicated, as otherwise the reaction becomes excessively violent, and the proportion of alizarin is diminished.

The liquid resulting from the above reaction, is diluted with eight or ten times its volume of water, boiled for a few minutes, and then thrown on a filter. On cooling, the alizarin is deposited in the form of a red jelly, which, when examined under the microscope, is seen to consist of distinct needle-like crystals. The mother liquor has a deep red colour, and contains a considerable quantity of alizarin in solution. When diluted with water and properly neutralized, it can be used directly for dyeing purposes. It contains a large amount of sulphate of ammonia in solution.

In this process the zinc may be replaced by tin, iron, sulphur, carbon, and other bodies of a like nature.

We may represent the reaction which takes place by abstracting from the binitro-napthalin (C_{20} H_6 (N_2 O_8)), two atoms of nitrogen and two of oxygen, when the formula of alizarin (C_{20} H_6 O_6) is obtained. The N_2 O_2 so removed, by taking eight atoms of the hydrogen resulting from the action of the zinc on the sulphuric acid, becomes two atoms of ammonia (N H_4 O), which is found as sulphate of ammonia in the mother liquor. Some sulphurous acid is, however, evolved during the experiment.

The author gives the following method for preparing the binitro-napthalin used in this process. Three to four parts of monohydrated nitric acid (sp. gr. 1.5) are placed under a chimney with a good draught, and one part of napthalin gradually and cautiously added in small quantities at a time, keeping the liquid constantly stirred. Each addition of the napthalin causes a noise like the immersion of heated iron into water. On cooling, the liquid sets into a crystalline mass, which is drained, then washed to remove the acid, and dried. It constitutes the binitro-napthalin almost completely pure.

M. Roussin states that the alizarin obtained by his process possesses all the characteristics and reactions of ordinary madder alizarin. It is almost insoluble in water, soluble in alcohol and ether. It volatalizes between 215° and 240° C., yielding a yellow vapour, which deposits red needle-like crystals. It dissolves in alkalies with the characteristic colour, and is precipitated by acids. Like madder-alizarin, it furnishes most beautiful lakes, and dyes the same pure tints. The elementary analysis of this artificial alizarin, however, has not yet been made.

The author has also described some other reactions of binitro-napthalin, by which coloured products are obtained. By treating it with a protosalt of tin dissolved in caustic alkali, and heating the mixture in a water-bath, a precipitate is obtained, which when well washed is of a violet blue colour, and dissolves in alcohol, furnishing a deep violet solution which dyes perfectly.

A concentrated and boiling solution of cyanide of potassium also acts energetically upon binitro-napthalin. The liquid becomes reddish brown. When cold, the precipitate is well washed. It dissolves in boiling water and alcohol, yielding a deep blue solution.

On the Estimation of Mercury.*—M. H. Rose has recently indicated that the best method for the determination of mercury consists in precipitating it in the state of protochloride by phosphorous acid. When the liquid contains free hydrochloric acid, the temperature may be raised to 60° Cent., without the protochloride being reduced to the metallic state by the phosphorous acid. The precipitate is not formed immediately in very dilute solution; it is therefore necessary in such a case to allow the liquid to stand for twelve hours. The chloride is readily and entirely deposited when the liquor is sufficiently acid.

The precipitate is collected on a filter, washed with cold or even warm water, and

* *Repertoire de Chimie.*

dried at 100° Cent. This process applies very well in cases where the liquid contains much nitric acid, providing the solution is properly diluted with water.

Mercury can be easily separated by hydrochloric acid and phosphorous acid from copper, cadmium, zinc, and even bismuth, antimony, and arsenic. When bismuth is present, a large excess of hydrochloric acid should be first added to prevent the precipitation of oxychloride of bismuth. When the mercury has been separated as protochloride, the bismuth may be thrown down from the filtrate as oxychloride, and then reduced to the metallic state by fusion with cyanide of potassium.

When the solution contains antimony, this body should be retained in solution by the addition of tartaric acid, which does not interfere with the precipitation of mercurous chloride.

When the mercury is associated with lead, this process requires further modification, as the hydrochloric acid throws down chloride of lead with the chloride of mercury. For the separation of these metals, therefore, sulphuric acid must be first added, together with a quantity of alcohol equal to about one-sixth of the volume of the liquor. If too little sulphuric acid be added, some yellow subsulphide of mercury may be formed. The precipitate of sulphate of lead is collected, washed with acidulated dilute alcohol, and the mercury determined in the filtrate.

Extraction of Silver from Galena.*—Sulphide of silver and chloride of lead mutually decompose when heated ; the product consisting of chloride of silver and sulphide of lead. This reaction has been successfully applied to the treatment of argentiferous galenas, in which the silver exists, as is known, in the state of sulphide. The process is as follows :—

The galena is mixed with one per cent. of chloride of lead and ten per cent. of common salt, and the mixture fused ; the chloride of silver formed unites with the chloride of sodium, and the double chloride floats on the surface ; when it is run off, and the silver separated by the usual processes.

Preparation of Hydrate of Baryta.—The preparation of hydrate of baryta by means of sulphide of barium and oxide of copper, is costly. M. A. Muller, therefore, replaces the latter by oxide of zinc. This oxide being slightly soluble in baryta water, it is removed by adding some of the sulphide of barium reserved for the purpose, and then getting rid of the slight excess of sulphide by a solution of sulphate of copper.

ON THE USEFUL PLANTS OF PARAGUAY.†

BY DOMINGO PARODI.

(*Continued from page* 567.)

Caá-robá (Guarani), *Jacarandá* (Spanish); Nat. ord. *Bignoniaceæ*, genus *Jacaranda.* Various *Bignoniaceæ* are reputed specifics for the cure of syphilis, but the *Caá-robá* and *Paráparay guazú* are the most esteemed; their effects, however, appear much exaggerated. The leaves and bark contain a large amount of tannin, which strikes a green with a per-salt of iron, and appears to be the principle to which are due the good effects sometimes produced by these plants, especially in affections of the skin.

Caá-rurú-guazú and *Caá-rurú-mí* (Guar.), *Mercuriales* (Span.); Nat. ord. *Euphorbiaceæ*, genus *Mercurialis.*—Used in decoction as a purgative, and also in dropsy and retention of urine.

Caá-rurú (Guar.), *Fitolaca* (Span.); Nat. ord, *Phytolacceæ*, genus *Phytolacca.*—Employed as the *Mercurialis* on account of its purgative properties.

Caá-rurú-monoté (Guar.), *Bledo blanca* (Span.); *Caá-rurú-pitá* (Guar.), *Bledo encarnado* (Span.); *Caá-rurú-quiza* (Guar.), *Bledo grande* (Span.); Nat. ord. *Chenopodiaceæ*, genus *Blitum.*

Caá-tay (Guar.), *Yerba sanguinaria* (Span.); Nat. ord. *Polygonaceæ*, genus *Polygonum.*—The herb is slightly astringent.

Caá-ti-hubaé, *Caápetay* (Guar.), *Escabiosa negra* (Span.); Nat. ord. *Dipsaceæ*, genus *Scabiosa.*—This plant is supposed to be a specific in lepra and scabies.

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* *Polyt. Notizbl.* and *Journal de Pharmacie.*

† *Revista Farmaceutica de Buenos Aires*, Jan., 1861.

Caángay (Guar.).—A sort of wild chicory, sometimes mistaken for taraxacum.

Caá-yguazú (Guar.), *Solono* (Span.); Nat. ord. *Solanaceæ*, genus *Solanum*.—Macerated in urine it produces a blue colour, which is employed in dyeing.

Caá-yupé (Guar.), *Tanaceto* (Span.); Nat. ord. *Compositæ*, genus *Tanacetum*.—Plant having a strong and balsamic odour; it is used as a stimulant and also as a vermifuge.

Caá-yuquí (Guar.), *Llanten* (Span.); Nat. ord. *Plantagineæ*, genus *Plantago*.

Cabará-caá (Guar.), *Yerbabuena silvestre*; Nat. ord. *Labiatæ*, genus *Mentha*.

Cambá-acá (Cabeza de negro); Nat. ord. *Byttneriaceæ*, genus *Guazuma*.

Cambá-nambí (Oreja de negro); Nat. ord. *Leguminosæ*, genus *Mimosa*.

Camambú (Guar.), *Alquequenje* (Span.); Nat. ord. *Solanaceæ*, genus *Alkekengi*.

Capíi-catí (Guar.), *Esquenanto* or *Paja de meca* (Span.); Nat. ord. *Gramineæ*.—A small plant having a persistent smell, and an aromatic, pungent, resinous taste; properties which the root also possesses to a more or less degree. Employed in leucorrhœa and stone in the bladder, as well as in spasms.

Capíi-nungaró (Guar.), *Gladiolo* (Span.); Nat. ord. *Irideæ*, genus *Iris*.—A plant of fœtid odour, employed in dropsy.

Carachí, *Curé* (Guar.), *Panporcino* (Span.); Nat. ord. *Primulaceæ*, genus *Cyclamen*.—Root of orbicular form, and of an acrid, caustic taste. There are two varieties, distinguished as the *large* and *small*, which are used indiscriminately in several very different complaints, but especially in amenorrhœa and dropsy, and externally in ringworm.

Caraguata (Guar.); Nat. ord. *Bromeliaceæ*.—A plant found in abundance throughout the country; the strong textile fibre afforded by its leaves is used for making coarse fabrics, cords, &c. The saccharine fruit, which is used when cooked as an anthelmintic, produces by fermentation a spirit of very agreeable flavour. Another species of *Caraguata* is called *Ibará*.

Caraguata-ne (Caraguata hediondo); Nat. ord. *Liliaceæ*, genus *Aloë*.—A plant with large fleshy leaves, bordered with spines; the outer part of the leaf is furnished with vessels that abound in a bitter juice, which [when dried] has all the properties of Socotrine Aloes. A broken leaf exhales an offensive odour, whence the name *hediondo* (fœtid).

Carandáy (Guar.), *Palma Negra* (Span.); Nat. ord. *Palmeæ*, genus *Copernicia*.—A palm growing in humid and inundated spots along the borders of rivers. Its fibrous, compact stem is used for posts and joists.

Catingá or *Cachingá* (Guar.); genus *Cusparia*.—Its bark affords an esteemed red dye.

Caá-betí (Guar.); Nat. ord. *Cedrelaceæ*.—Wood white, porous, of small value.

Cebil (Guar.); Nat. ord. *Leguminosæ*, genera *Mimosa* and *Acacia*.—The generic name of various species of *Mimosa* and *Acacia*, affording good timber for building, and astringent barks for tannin.

Cedro; *Cedrela odorata*, and *C. Brasiliensis* (*Cedrelaceæ*).—Of this tree there are two varieties, distinguished by the names *Cedro blanco* and *Cedro colorado*. They attain a large size, sometimes measuring 120 feet high, with a stem of $4\frac{1}{2}$ feet in diameter. The bark and fruit are full of a fœtid, alliaceous juice. The wood is reddish, light, easily worked, not attacked by insects, and of an agreeable smell; it is used for carpenter's work and cabinet-making, and is also employed, on account of its lightness, to render more buoyant the rafts of heavy woods that descend the rivers. The *Cedro ná* is a superior variety on account of its solidity, and the beauty of its markings.

Coqueri (Guar.), *Duraznero silvestre* (Span.); Nat. ord. *Rosaceæ*, genus *Amygdalus*.

Cumandá (Guar.), *Judias* (Span.); Nat. ord. *Leguminosæ*, genus *Phaseolus*.

Cumbarí (Guar), *Pimiento* (Span.); Nat. ord. *Solanaceæ*, genus *Capsicum*.

Cupaí (Guar.), *Arbol del Copaiba* (Span.); Nat. ord. *Leguminosæ*, genus *Copaifera*.—A tree abounding in the woods of all districts, especially in the neighbourhood of S. Antonio, a few leagues from this capital. The oleo-resin is of good quality, but is collected only for home consumption, it being the remedy in common use for cuts, sores, ulcers, &c. The wood is somewhat similar to the Cedro; it is used for carpenter's work and as firewood.

Curatú (Guar.), *Culantro* (Span.); Nat. ord. *Umbelliferæ*, genus *Coriandrum*.

Ceibo (Guar.); *Erythrina Crista-galli* (*Papilionaceæ*). Wood spongy and light.

Curé-piré (Guar.), *Juncia* (Span.); Nat. ord. *Cyperaceæ*, genus *Cyperus*. The roots of this plant are thin, and have at their extremities tubercles the size of hazel-nuts, which are of a saccharine and oily taste, and are reckoned aphrodisiac.

Curíy (Guar.), *Pino Americano* (Span.); Nat. ord. *Coniferæ*, genus *Araucaria*. —This tree, which is as straight and tall as the pines of northern regions, is called by the Brazilians *Pinheiro*. Its timber is used for building, for the masts and yards of vessels, and likewise for planks. From an incision or hole bored in the trunk, a somewhat reddish coloured turpentine is obtained, which is preserved in calabashes and used as an efficacious remedy in wounds, ulcers, &c. The fruit, which grows larger than an ostrich's egg, contains large oily seeds which are edible when roasted. The Indians are said to prepare flour and bread from them.

Curuguay (Guar.), *Calabaza* (Span.); *Cucurbita* sp.

Cuapepé (Guar.), *Zapallo* (Span.); *Cucurbita*.

Curupay ná, *Curupay-curu*, *Curupay atá* (Guar.); *Leguminosæ*, genera *Mimosa* and *Acacia*.—A variety of trees, whose astringent bark is used for tanning. The wood, hard and compact, is used for posts and fences, also for the manufacture of excellent charcoal.

Curupicay (Guar.); *Euphorbiaceæ*.—A lofty tree from which by incision a viscid juice is obtained, which is used as bird-lime. A decoction of the wood is said to be efficacious against snake bites.

Cururuyby (Guar.); *Loranthus* sp. (*Loranthaceæ*).—The bark is generally used for tying the bundles of straw used in thatching the farm houses.

(*To be continued.*)

ON THE TÆNIFUGES (ANTHELMINTICS) OF ABYSSINIA.

BY DR. COURBON.

The tænifuges stand at the head of the Abyssinian materia medica; they are, perhaps, the only remedies which the Abyssinians know how to employ, and which are really useful to them. Amongst these tænifuges, the most important are, *Kousso* and *Mesenna*; then come the *fresh bark of the Pomegranate*, *habi-tsalim*, *habi-tchogo*, *belbelta*, and *soaria*. We propose to make a few remarks upon each of these tænifuges, some of which are but imperfectly known.

Kousso.—It is termed *Kosso* or *Kousso* in Amhara, and *habi* in the language or dialect of Tigre;* it is also named *kotz* or *kabotz* by Brayer. It is the produce of a Rosaceous plant, of the tribe Spirææ, and is closely allied to the genus Agrimonia; it is the *Brayera anthelmintica* of Kunth, *Hagenia anthelmintica* of Lamarck, *Banksia abyssinica* of Bruce. The first name,—that of Kunth, is the one by which it is commonly known.

Brayera anthelmintica is a beautiful tree, with dicœcious flowers, from eight to fifteen metres high (from about twenty-six to fifty feet), crowned by a tuft of leaves, which are large, impari-pinnate, and fall off in the same way as those of the Date tree. The flowers are in large pendulous bunches. It is found distributed over nearly the whole of the table-land of Ethiopia, but principally in the provinces of Samen, Lasta, Gojam, and Golta. It flowers in December and January. The flowers are the only parts used as remedial agents; the dose being a handful. The flowers are also found in the country, in small packets of thirty-five grammes (about nine drachms, troy weight); each packet forms a single dose for a strong man, and a dose and a half for young persons and individuals of a delicate constitution.

The following is the way in which the Abyssinians administer *Kousso*:—They first reduce it into a coarse powder, then put this powder into an ox-horn holding about a demi-litre (three-quarters of a pint); this is filled up with water or some other liquid, and after having been mixed with the finger, it is swallowed. Immediately after the medicine is taken the patient lies or sits down, and remains perfectly quiet. No inconvenience is experienced in taking the Kousso, but soon afterwards

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* In Amhara, the *tænia solium* and the principal remedy they employ for it, are designated by one and the same name, which is *kousso* or *kosso*. This last word is also employed in Tigre, but only to designate the tænia, since *habi* is the name which they give in that language to the tænifuge medicine. This word *habi* means literally, *a remedy of a pulpy consistence*.

it produces nausea accompanied with great acridity. An hour after taking the medicine the patient has an ordinary solid stool, an hour or half an hour later a liquid stool, and at the end of three hours, or sometimes of from four to six hours, the *tænia solium* is expelled in the form of a whitish ball or knot. The Abyssinians take the Kousso fasting, and do not take their first repast until the tænia has been expelled. The servant has a habit, to this day, of presenting himself to his master with a cross of straw in his hand, and saying to him, *Encotatach* (gift). The master understands that he has taken Kousso, and gives him, under such a circumstance, a gratuity. The Abyssinians take Kousso regularly every two months. This is a general rule for every one except children under seven years of age, for the *tænia solium* does not make its appearance except in very rare cases in persons before they have arrived at that age.

I have detailed the manner in which the Abyssinians administer Kousso. In Europe, they either simply pour upon twenty grammes (about five drachms, troy weight) of the flowers, coarsely powdered, 250 grammes of lukewarm water, and leave them to infuse for a quarter of an hour, and in the morning, fasting, drink all the mixture; or better, in the way I have described in the *Repertoire de Pharmacie*, vol. xvii., page 23.

Mesenna.—The *mesenna*, generally termed *musenna*, is named by Aubert-Roche *bisenna*, and *besenna* by Ant. Petit, as also by Ach. Richard in his Flora of Abyssinia; but its proper name in Amhara, is *mesanna*, and in Tigre, *besanna*.

According to Aubert-Roche it is derived from the *Juniperus virginiana*, Linn.,* and he even adds "that they take it mixed with honey, to which it communicates an agreeable terebinthinate taste." (*Bulletins de l'Académie de Médecine*, vol. vi., page 498.) Ach. Richard speaks of it as an undetermined leguminous plant, which he named *Besenna anthelmintica*. Since his time nothing more accurate has been known of the plant furnishing *mesenna*. I have brought for the first time to Europe the flowers and the fruit of this plant, which I have deposited with all my collections in the Museum of Natural History, and hence the place which the mesenna should occupy in the classifications of the vegetable kingdom may be determined.

Mesenna belongs to the Natural order Leguminosæ, Sub-order Acacieæ or Mimoseæ. It is closely allied to the Acacia of Upper Egypt, *Acacia lebbek*, Del., *Albizzia lebbek*, Benth.; consequently, we call it, to preserve as much as possible the name of Ach. Richard, *Albizzia anthelmintica*.

Albizzia anthelmintica is a tree of from four to six metres high (from about thirteen to twenty feet), generally the thickness of the thigh or more, and but rarely attaining that of the body, with a thick and very rough bark, and with impari-pinnate leaves bearing three or four pairs of leaflets. The *flowers* are arranged in globular heads; the corolla and calyx are of a greenish colour; the *stamens* numerous and monadelphous below, and having white filaments terminated by very small green anthers; the *pistil* is of equal length with the stamens (three centimetres) (about an inch), and has also a white style crowned with a very slender capitate ? stigma.

Lastly, the flattened legume, which becomes whitish in drying, presents the very same appearances as that of the *Albizzia lebbek*, only it is much smaller. I found this tree at Mahiyo in Tarrenta, on the route from Halay to Massouah; it is very common around Dixah and Hebo. It is met with especially in Samen, and in general in all parts of Abyssinia of the same elevation as it.

The bark of the plant is the only part used. M. Gastinel, Professor of Chemistry to the Faculty of Medicine at Cairo, has informed me, that he had found it to contain, amongst other substances, a large quantity of gum, and a peculiar principle analogous to the alkaloids, which appeared as a whitish amorphous powder, and combined with most acids.

The Abyssinians take Mesenna in several ways; but it is always the powdered bark which is used, in doses of two handfuls, about 60 grammes (nearly 15½ drachms troy weight). Thus, they dilute it with some water or other liquid; or they mix it with flour, and make it into a kind of bread; or, they incorporate it with butter, honey, &c., and form it into little balls, which they swallow. The remedy is swallowed in

* At the present time, the Juniper of Abyssinia (*Juniperus procera*, A. Rich), is regarded as the same plant as *Juniperus virginiana*.

the morning, the first meal being taken three or four hours afterwards, and no change is made in their customary habits. Mesenna is entirely tasteless; it creates no nausea, does not produce any pain, or cause any disorder in the different functions. In the evening there is a solid stool, mixed with some serous fluid, in which may be seen some fragments of the tænia. It is usually not until the next day, either in the morning or evening, that the greater part of the entozoa are thrown off in a sero-mucous stool and in a broken or pounded state. The following days the stools also contain fragments of tænia, always in the same condition.

Mesenna is perhaps the best tænifuge; it removes most completely the tænia solium. It is certain, that after its administration, the fatal period of two months is passed without any symptoms occurring which are indicative of it.* Mesenna acts in a very peculiar way upon the tænia, since after its ingestion, the tænia, as I have been assured, is always passed in a fragmentary or pounded condition.

This tænifuge has also been several times employed beyond Abyssinia. M. Pruner-Bey has administered it twenty times in Cairo, with complete success. He has always used the powder in doses of 60 grammes (about 15½ drachms, troy weight), mixed with meat minced and lightly cooked. M. Gastinel, of whom I have already spoken, has assured me, that an infusion of 30 grammes of powder has succeeded in the only case in which he had tried it. I know, however, that the bark of Abyssinia has completely failed in the hands of several naval surgeons; but the dose, which in these cases never exceeded from 15 to 20 grammes, was insufficient.†

Habi-tsalim.—*Habi-tsalim*, improperly called *abitzelim* by Quartin-Dillon, and *habbe-zelim* by V. Schimper, is the name in Tigre of the *Jasminum floribundum*, R. Br. This Jessamine, which is very common throughout Abyssinia, is termed *temballal* in Amhara; it is a vine-like, climbing plant, resembling very much the *Jasminum officinale*, Lin.

Another species of Jessamine is very frequently met with in Ethiopia, the *Jasminum abyssinicum*, R. Br., which only differs from the former, in its corolla being violet outside instead of entirely white; and by the teeth of the calyx, which are long and setaceous, instead of being short and obtuse. The Abyssinians use these two Jessamines indifferently as tænifuges; the leaves are the parts which they employ, mixing them with the young shoots of the *ouera* or *aulé* (*Olea chrysophylla*, Lamk.). They take a handful of the mixture, to which they add a little water, and then pound it up carefully between two stones, by which they make a semi-fluid paste; this remedy is tolerably successful. M. l'Abbé Sapeto, interpreter to the mission, told me that he had himself taken it many times with success.

Habi-tchogo.—Here we have another plant the name of which has been changed by all who have spoken of it. Thus, Aubert-Roche calls it *abbatsjogo*, V. Schimper *habbe-tseuhukko*, and Ach. Richard *mischamitcho*; but its proper name in Tigre is *habi-tchogo*, and in Amhara *metchametcho*. The bulbs are the parts employed. The plant which produces them has been regarded by Ant. Petit as an Orchid, and by the commissioners appointed to examine the memoir of M. Aubert-Roche on the tænifuges of Abyssinia as allied to the *Ixia bulbocodium*, Linn. It is right to say that these commissioners, who were Dumeril and Merat, had only seen the bulbs of the plant. At the present time, it has been proved that these bulbs belong to an Oxalid, the *Oxalis anthelmintica*, Ach. Rich. This is a very pretty plant, covered with hair, with a subterranean stem, terminated by an ovoid bulb the size of a chestnut, with radical trifoliate leaves, from the midst of which rises a stalk crowned with purple flowers. The bulbs, as already noticed, are the only parts used, in doses of 60 grammes (about 16 drachms, troy), or more. The *habi-tchogo*

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* We know that the Abyssinians take kousso regularly every two months; for it is at the end of that period that the tænia, which the kousso has not completely destroyed, has again acquired sufficient development to cause inconvenience.

In France I have not known the tænia reproduce itself after a methodical administration of kousso. (See *Repertoire de Pharmacie*, vol. xvii., page 23.)

† The largeness of the dose obliged to be employed to produce success, may be regarded as an obstacle to the general use of mesenna in Europe; but it is probable that the active principle of the bark of Abyssinia resides in the alkaloid which it contains, and if means could be found to extract this substance easi the inconvenience just alluded to would disappear.

acts almost as well as Kousso; but it is not till 15 or 16 hours after its administration that the tænia is expelled.

Belbelta.—This tænifuge, which is also furnished by the vegetable kingdom, is called by V. Schimper *bolbilda*, and by Quartin-Dillon *bilbilla*, an Abyssinian word which signifies a little bell. Its true name is *belbelta*. This plant, whose synonymy is rather intricate, belongs to the family of *Amaranthaceæ*. It is the *Celosia adoensis*, Hochst.; *Celosia trigyna*, Lin.; *Achyranthes decumbens*, Forsk.; *Lestibudesia trigyna*, R. Br. It is a small herbaceous plant, with a straight, smooth, branched, nearly quadrangular stem, about 50 centimetres high (nearly 20 inches); alternate leaves, petiolate, oval or oval-oblong in form; flowers of a brilliant white, placed at the extremity of the stalks in little *glomerules*, which form bunches. According to Schimper, it is the leaves, the flowers, and the fruit, which are employed as tænifuge medicines; whilst according to MM. Ferret and Galinier, it is the bruised seeds. According to the last authors, it is a dangerous remedy, which produces great pain. It is impossible for me to obtain precise information on this subject.

Soaria.—The soaria, named by Schimper *saoria*, is a little shrub furnished by the family of *Myrtaceæ*, the *Mœsa picta*, Hochst.; *Mœsa lanceolata*, Forsk. It is met with only on those parts of the Ethiopian table-lands which are situated 2000 metres (about 6500 feet), at the least, above the level of the sea. The part used is the fresh fruit, or more frequently, the dried; it is reduced to powder, and taken mixed with cheuro, or with a bouillie of wheat. The dose is from 32 to 44 grammes (from about 8 to 11 drachms, troy). According to Schimper, it acts as surely as the Kousso.

Roman.—This is the name in Tigre, in Amhara, and in *Gheeza* (the ancient language of the Abyssinians), of the Pomegranate, *Punica granatum*, Linn. In Abyssinia, as in Europe, the bark of the root is the part used; but this remedy is rarely employed.

Tænifuges little known.—V. Schimper ranks among the tænifuges of Abyssinia the *angogo*, the fruit of a plant not yet determined, and the *ogkert*, which is the root of a *Caryophyllaceous* plant, the *Silene macrosolen*, Hochst. In spite of my researches, I can obtain no precise knowledge of these two plants. I can only learn that the word *ogkert* does not exist in the Ethiopian tongue, and that it has not even the construction and the consonance of an Abyssinian term.

Of all the tænifuges above described, the Kousso, the Mesenna, and the Metchametcho, are almost the only ones in use.

OTHER MEDICINAL PLANTS OF THE ABYSSINIANS.

A large number of other plants are used in different complaints. There is, perhaps, no plant in Abyssinia which has not its real or imaginary virtue. We shall here only notice some of the principal ones.

Endaholla.—This is the name in Tigre and in Amhara of a *Crassulaceous* plant which is very common throughout Abyssinia, the *Kalanchoe glandulosa*, Hochst. The fruits pounded and mixed with honey are considered to excite contractions of the uterus, and to assist labour.

Imbouai.—The fruit of a *Solanum*, the *Solanum marginatum*, Lin., is thus called. It is also very common upon all the table-land of Ethiopia. Slices of this fruit applied to the scalp might be used with much advantage to remove scurf. It is certain that this plant is an excellent depilatory, and that it is daily used through the country to remove hairs from the skin.

Melita.—This plant, called by Bruce *woginoos*, belongs to the family of the *Zanthoxylaceæ*; it is the *Brucea antidysenterica*, Mill. It is met with on the slopes of the Debra-Tzai, which lead into the Kolla. It is very much valued in the treatment of dysentery and diarrhœa. It is the fruit pounded with a certain quantity of water which is used. Bruce speaks of having been cured by this remedy in a few days of a very obstinate dysentery.

Tenchaic.—A plant of the family of *Capparidaceæ*, the *Cadaba farinosa*, R. Br. The infusion of the leaves is used as a gargle in sore-throat.

Let us mention also amongst the medicinal plants which are frequently met with

in Abyssinia: the *Euphorbia lathyris*, Lin., and the *Euphorbia petitiana*, A. Rich., the seeds of which are sometimes mixed with Kousso to promote its action; the Castor Oil plant, *Ricinus communis*, Lin., called in the country *goulkoua*; the *Tamarind* tree, *Tamarindus indica*, Lin.; and two beautiful species of *Aloë*, which are found almost everywhere.—*Repertoire de Pharmacie.*

COMMERCIAL PRODUCTS OF THE ASPHODEL.

BY SIR W. J. HOOKER, K.H., F.R.S.

Every one is familiar with the pretty, lovely-looking white-flowered Asphodel of our gardens. In the South of Europe, and apparently on both sides of the basin of the Mediterranean, the plant *(Asphodelus ramosus)* is extremely abundant; though it has never, so far as I know, been turned to any account, except that in times of scarcity its acrid fasciculated roots, after much boiling, have been eaten by the poor. In the Paris Exhibition of 1855, there were shown bottles of alcohol extracted from the Asphodel; specimens of the residuum of the roots after being twice distilled; paper-stuff from the stalks and leaves of Asphodel—card-paper, cards, paper and writing-papers, of various qualities, manufactured from the same, and mixed in various proportions with rags and common paper-stuff. M. de la Bertoche, in a pamphlet, asserts that Asphodel roots contain upwards of 27 per cent. of alcoholic principle, or more than double the quantity which resides in the root of Beet. The stalks and leaves contain a remarkably tenacious fibre, fine, strong, and flexible. The distillation of Asphodel root has been already pursued, and with considerable success, in Algeria; but the immense abundance of the plant in Tuscany, where it has hitherto been considered only a pernicious and most ineradicable weed, points to the advantage of endeavouring to turn it to account. The fasciculated roots, after cleansing and crushing, are mixed with water, and the fluid is exposed to heat, so as to facilitate fermentation. The alcohol which it yields is pure and colourless, perfectly transparent, and has the colour of alcohol itself. It contains neither acid salt, nor oily matter; it burns without leaving any residue, and the flame is remarkably bright. But at the present time, when material for paper seems likely to fail, a most important succedaneum is afforded by the remains of Asphodel. It is undeniable that the residuum of the roots after distillation, together with the other parts of the plant, are eminently adapted to this object.

Three processes are necessary; the separation of the useful portions,—the bleaching,—and the reducing the substances into a homogeneous and tenacious pulp. The first is better effected by crushing than by grinding, as the latter mode is apt to destroy the fibre. The second operation involves most difficulty, as the root is covered with a skin which contains a tanning principle; and it is necessary, unless the expensive mode of hand-picking the root be adopted, to expose the substance to air and light, aided by immersion in diluted chlorine, which brings the substance to a very pale brown tint, which is not objectionable for many sorts of paper. For the third process, that of reducing the whole mass to a smooth and tenacious paste, the paper manufacturers must supply the details.—*The Technologist.*

ON SOME PHENOMENA ATTENDING COMBUSTION IN RAREFIED AIR.

BY E. FRANKLAND, F.R.S.

(*Delivered at the Royal Institution, March 8th*, 1861.)

The investigation forming the subject of this discourse had its origin in some experiments which the speaker made upon the summit of Mont Blanc, in the autumn of 1859, for the purpose of ascertaining the effect of atmospheric pressure upon the amount of combustible matter consumed by a common candle. He found, as the average of five experiments, that a stearin candle diminished in weight 9.4

grammes when burnt for an hour at Chamonix; whilst it consumed 9.2 grammes when ignited for the same length of time on the summit of Mont Blanc. This close approximation in the quantity of combustible matter consumed under such widely different atmospheric pressures, goes far to prove that the rate of combustion is entirely independent of the density of the atmosphere. This result was subsequently confirmed by a repetition of the experiments in air, artificially rarefied, until it supported a column of only nine inches of mercury.

In burning the candles upon the top of the mountain, it was noticed, in the subdued light of the tent in which the operation was performed, that their luminosity was much less than usual. The lower and blue portion of the flame, which, under ordinary circumstances, scarcely rises to within a quarter of an inch of the apex of the wick, now extended to the height of one-eighth of an inch above the cotton, thus greatly reducing the size of the luminous portion of the flame; and, on subsequently repeating the experiments in artificially rarefied atmospheres, and measuring the amount of light emitted in each case, it was found that as the rarefaction proceeded, the blue or non-luminous portion of the flame gradually extended upwards until it finally expelled, as it were, the yellow or luminous part even from the apex of the flame. During the progress of the rarefaction, the flame became somewhat enlarged, assumed an ellipsoidal shape, and ultimately became almost globular, whilst a large external shell of bluish-pink flame gradually came into view as the last portion of yellow light was disappearing from the apex of the flame, which had alone been previously visible. It is scarcely necessary to add, that during these changes in the flame, the light underwent a rapid diminution; the rate of its decrease, however, was subject to considerable irregularities from the heating of the apparatus surrounding the candle, and the consequent guttering and unequal combustion of the latter. For the accurate measurement of the diminution of light, therefore, recourse was had to coal gas, which, although also liable to certain disturbing influences, yet yielded results, during an extensive series of experiments, exhibiting sufficient uniformity to render them worthy of confidence.

By passing the gas through a "governor," uniformity of pressure in the delivery tubes could be secured; and by other appropriate arrangements a uniform amount of gas, viz. 0.65 cubic feet per hour, was made to burn in each experiment within the atmosphere of varying density. This experimental flame was placed at one extremity of a Bunsen's photometer; whilst, as a standard for comparison, a similar jet of gas, surrounded by a glass shade, and burning freely in the air with a uniform consumption, was fixed at the opposite end of the photometer. In the case of the experimental flame, the products of combustion were completely removed, and a steady supply of fresh air constantly supplied.

The following table contains a summary of the results of these determinations, the illuminating power given under each pressure being the average of twenty closely accordant observations. In each series the maximum illuminating effect—that is, the light given by the experimental flame when burning under the full atmospheric pressure—is taken at 100:—

FIRST SERIES.

Pressure of Air in inches of Mercury.	Illuminating Power of Experimental Flame.	
	Observed.	Calculated.
29.9	100	100
24.9	75.0	74.5
19.9	52.9	49.0
14.6	20.2	22.0
9.6	5.4	— 3.5
6.6	.9	—18.8

SECOND SERIES.

Pressure of Air in inches of Mercury.	Illuminating Power of Experimental Flame.	
	Observed.	Calculated.
30.2	100	100
28.2	91.4	89.8
26.2	80.6	79.6
24.2	73.0	69.4
22.2	61.4	59.2
20.2	47.8	49.0
18.2	37.4	38.8
16.2	29.4	28.6
14.2	19.8	18.4
12.2	12.5	8.2
10.2	3.6	—2.0

An inspection of these results indicates that even the natural oscillations of atmospheric pressure cause a considerable variation in the amount of light emitted by gas flames. In order to determine these variations, the following special series of experiments was made, the pressures being very accurately ascertained by means of a water-gauge:—

THIRD SERIES.

Pressure of Air in inches of Mercury.	Illuminating Power of Experimental Flame.	
	Observed.	Calculated.
30.2	100	100
29.2	95.0	94.9
28.2	89.7	89.8
27.2	84.4	84.7

It is thus evident that the combustion of an amount of gas which would give a light equal to 100 candles, when the barometer stands at 31 inches, would afford a light equal to only to 84.4 candles if the barometer fell to 28 inches.

The results of these three series of observations taken together, show that, beginning at atmospheric pressure, and with 100 units of light, a decrease of almost exactly 5.1 units of light is the result of each diminution of mercurial pressure to the extent of one inch, until the barometer stands at 14 inches, below which the diminution of light takes place in a less rapid ratio. One of the columns headed "Calculated," in the above tables, exhibits the illuminating power calculated from the constant flame just given, and it will be seen that these calculated numbers nearly coincide in most cases with the observed amount of light.

In explaining the cause of the above phenomena, the speaker referred to the conditions upon which the light of ordinary flames depends. He showed that in these flames there are two sources of light, viz. incandescent gaseous matter, and incandescent solid matter; but that, practically, 99 per cent. of the light of such flames owed its origin to the second of these sources. In gas, candle, and oil flames, the incandescent solid matter consisted of carbon in a minute state of division. The amount of light emitted by these flames depended, within certain limits, first, upon the quantity of solid particles of carbon existing, at any given moment, within the flame; and secondly, upon the temperature to which these carbon particles were heated. Now, the temperature of a flame might be affected by imperfect combustion in rarefied air; but it had been proved by the analysis of the products, that combustion was equally complete in the above experiments under all pressures; in

fact, it was found that complete combustion could be far more easily secured in rarefied air, than in air at the ordinary atmospheric pressure. Other experiments also showed, that the temperature of a flame was not materially affected by the pressure of the air in which it was burning; consequently, it was inferred that the diminution of luminosity in rarefied atmospheres, was not due either to imperfect combustion or to reduction of temperature.

The diminution of light must therefore arise from the decrease of the amount of solid carbon separated within the flame; and this the speaker believed to be due to the admission of oxygen in larger quantities into the interior of the flame when the atmosphere was rarefied. It was shown by experiment that the admission of a comparatively small amount of air, and consequently of oxygen, into the interior of a gas flame, immediately reduced the illuminating power of the latter to a very marked extent; the carbon particles, instead of being separated as such in the interior of the flame, being at once oxidized to carbonic oxide. This increased access of oxygen to the interior of a flame burning in rarefied air, was believed to be due to the greater mobility of the particles of expanded gases, which enable the gases of the flame and the circumambient air to commingle more rapidly than at ordinary atmospheric pressure.

The cause of the less rapid decrease of the light of flames burning in atmospheres below 14 inches of mercurial pressure was due to the comparative prominence assumed by the light of the incandescent gaseous matters of the flame at such high stages of rarefaction; this gaseous illumination being affected by pressure to a much less extent than that afforded by incandescent carbon particles.

In his celebrated researches on flame, Davy had not overlooked the diminution of light by decrease of pressure, but he had not determined the diminution quantitatively, nor indicated its cause.

The speaker stated in conclusion, that he had only yet imperfectly extended his inquiry to pressures higher than that of the atmosphere; but, so far as these experiments went, they appeared to indicate that the law which had been elicited for lower pressures also held good for pressures above that of the atmosphere.

A MEANS OF DETECTING THE PRESENCE OF CASTOR-OIL IN THE VOLATILE OILS.

BY HARRY NAPIER DRAPER, F.C.S.L.

As a general rule, the volatile oils which are employed in pharmacy and perfumery are, at least in our markets, to be obtained pure; but it does occasionally happen that they are sophisticated with some fluid of low price. Turpentine of wood, alcohol, and the fixed oils are the most common adulterants. It is a very simple matter to detect alcohol, and the admixture of turpentine so much deteriorates the proper odour of the oil that but slight experience is required for its recognition. The insolubility of nearly all the fixed oils in alcohol, and the consequent facility of ascertaining their presence by simple treatment of the suspected sample with this reagent is so well known, that this mode of adulteration is seldom attempted. Castor-oil forms, however, an exception to the general behaviour of this class of bodies in this respect. Soluble not only in alcohol, but in all menstrua which dissolve the volatile oils, its recognition by the means just pointed out would be impracticable, and its miscibility with alcohol can even be taken advantage of to introduce the latter into the volatile oil in such proportion as to imitate the natural fluidity of a pure specimen. Having recently had occasion to examine an oil which was suspected to be adulterated in this manner, it occurred to me that the reaction by which ricinus oil when treated with nitric acid gives rise to *œnanthylic acid* ($C_{14}H_{13}O_3 + HO$) might be taken advantage of for its detection.

This body is a product of the oxidation of the castor-oil, and is formed when the warm oil is treated with an excess of nitric acid. A violent action ensues, during which much nitrous acid is disengaged, and there is found floating in the acid liquid, when the residue is mixed with water, a soft unctuous mass, which is, I believe, the *palmine* of Boudet, accompanied by fatty acids. If the acid liquid be now neutralized with carbonate of soda, so as to entirely remove the odour of

nitrous acid, the smell of the œnanthylic acid can be most clearly recognized. It is upon this fact that I have based the method of detecting the presence of castor-oil which is now to be described. The *modus operandi* is as follows:—Twenty drops of the suspected oil are placed in a small porcelain capsule, and heated on a sand-bath until the odour of the oil is no longer perceived. To the residue—if there be any—add five or six drops of nitric acid, and as soon as the action has subsided dilute with a solution of carbonate of soda. If castor-oil be present the odour of the œnanthylic acid will now be at once perceived, and, once smelled, is not likely to be mistaken for any other. As, however, it can hardly be compared to any other familiar odour, any one who has occasion to use this test will do well to make the experiment with castor-oil alone, and to acquaint himself with the peculiar smell.

In this way I have been able to detect the admixture of five per cent. of castor-oil in volatile oils, and have no doubt even a much smaller proportion could be recognized.—*Dublin Medical Press.*

ON PLATINUM.

BY PROFESSOR FARADAY, D.C.L., F.R.S.

(*Substance of a Lecture delivered at the Royal Institution, Feb.* 22, 1861.)

The discourse was founded on the recent investigations of MM. Henri Ste. Claire Deville and H. Debray regarding the characters and conditions of the platiniferous metals, and the new process of working the ore which they have established on their results. Wherever platinum occurs, it is usually, if not always, accompanied by five other remarkable metals, namely, Ruthenium, Osmium, Iridium, Rhodium, and Palladium; and in addition, by other substances, as iron, copper, gold, silver, and sand. Being washed, the heavy particles are left as the general ore of platinum; this metal constituting by far the largest part of the substances.

The six metals, when obtained apart and purified, form two groups of three each; each group having an equivalent number very different from that of the other group, as appears in this table:—

Equivalent number, 95.5.	Spec. grav.	*Equivalent number*, 53.	Spec. grav.
1. Osmium	21.40	2. Ruthenium	11.3
3. Iridium	21.15	4. Rhodium	12.1
5. Platinum	21.15	6. Palladium	11.8

The three in the first group have the same equivalent number, and nearly the same specific gravity; but osmium takes the place of platinum as the heaviest of bodies. The equivalent number of the second group is alike for all, but it is little more than half that of the former group. The specific gravity also of the group is little more than half that of the former group: from which it results that an equivalent of any of these will have very nearly the same volume as an equivalent of any one of the heavier group.

There are certain analogies between 1 and 2; 3 and 4; 5 and 6; platinum is more like palladium than like the other metals. These numbers also represent the order of fusibility. Osmium has not as yet been fused; the rest have, in the order given. Platinum appears among them as a comparatively easily fusible metal. They are all volatile at very high temperatures, even osmium disappearing whilst the mass remains solid.

The platinum has usually been obtained from these ores (after they have been well washed, sifted, and mechanically separated) by the action of nitro-muriatic acid; which, bringing the platinum into solution, supplies a fluid which, on the addition of muriate of ammonia, &c., throws down a precipitate of ammonio-chloride of platinum. This, washed, dried, and heated, gives spongy metallic platinum; which being then pressed, heated, and hammered, yields massive platinum, the aggregation of the particles taking place entirely by adhesion and welding. Instead of forming a solution by acids, Deville proposes to employ a heat fluxion process; and instead of welding, to fuse the metal together at the last by intense heat, obtained by the use of the oxy-hydrogen or the oxy-coal-gas blowpipe. The ore, properly prepared, is mixed with its weight of galena, or native sulphuret of lead,

and half its weight of metallic lead; it is then heated and well stirred together, the iron and some other metals are taken up by the sulphur of the galena, the platinum and other metals are taken possession of by the lead; and when the action is well effected, the access of air is adjusted until the remaining part of the sulphuret is decomposed, and only platiniferous lead left at the bottom part of the crucible or furnace, with scoriæ upon it. The former is separated, and then heated, exposed to air until much of the lead is oxidized; which, escaping as litharge, leave at last an alloy of lead and platinum, containing not more than 10 or even 5 per cent. of lead. Such an alloy of platinum requires a very high temperature to fuse it, and this is therefore attained and applied in furnaces constructed of chalk-lime, heated by the insertion of gas blowpipes. The heat first melts the alloy, and being combined with oxygen in a little excess, the remaining lead is rapidly oxidized and dissipated in fumes; and then being raised and continued, any gold, copper, osmium, or other metals, except iridium and rhodium, are also converted into vapour and driven off. The platinum remaining is at last heated to a still higher degree, and is either cast into flat cakes or granulated; and this has been done with quantities weighing even as much as 40lbs.

The resulting metal contains some iridium and some rhodium, being, in fact, an alloy of platinum; but it is an alloy which, being harder than platinum, and even less liable than it to the chemical action of acids and other chemical agents, is as useful as the pure substance in the ordinary applications of the metal. As iridium and rhodium have no employment at present better than that of alloying platinum, their quantity has been purposely increased until it has made as much as 25 per cent. of the mass.

A mixed process has been devised by MM. Deville and Debray, which gives a platinum purer than any heretofore obtained. It is then as soft and ductile as silver. But for this process, for general directions and minute particulars, and for most interesting matter about all the metals of the platinum group, the reader is referred to the 56th and 61st volumes of the *Annales de la Chimie.*

PINE-WOOL.

BY M. C. COOKE, F.S.S.

A NEW manufacture has recently sprung into existence on the continent of Europe which promises to become one of importance. It consists in the utilization of the acicular leaves or "needles" of coniferous trees, hitherto a waste substance. It was long ago known that pine-leaves consisted of a bundle of tough fibrous material, agglutinated together, and bound into long rigid leaves by means of a resinous integument; but the practical development of this knowledge is but of recent date. Near Breslau, in Silesia, there are two establishments, both of which are worthy of notice. One of these is a factory where pine-leaves are converted into a kind of cotton or wool; and the other, an establishment for invalids, in which the waters used in the manufacture of the pine-wool are employed as curative agents. These establishments have both been erected, as we are informed, by M. Pannewitz, the discoverer of the process employed for obtaining the fibrous material from pine-leaves. This material he calls "woody wool." It can be curled, felted, or woven. We are not acquainted with the precise method employed by M. Pannewitz, but we have succeeded in obtaining a coarse brownish-yellow fibre by boiling pine-leaves in a solution of caustic alkali for a few hours; and after rinsing and boiling them again in alkaline liquor, and saturating them in a solution of chloride of lime, a whiter and finer substance, much resembling the pine-wool wadding now being imported from the Thuringer-wald. It is stated that by the mode of preparation employed by M. Pannewitz, the woolly substance acquires a quality more or less fine, or remains in its coarse state. In the former case it is employed as wadding, and in the latter as a stuffing for mattresses. The leaves may be stripped from the trees when quite young without injury, and a man may gather 200 lb. per day.

The first application of this fibrous material consisted in its substitution for cotton with wool in the manufacture of blankets. Five hundred of these were sold to an hospital at Vienna, and after a trial of several years they are now exclusively used.

Amongst the enumerated advantages, it has been stated that no kind of insect will lodge in the beds, and that the odour has been found agreeable and beneficial. Since this period, the same kind of blankets have been adopted at the Penitentiary and some other institutions in Vienna, as well as in the barracks at Breslau. Its application for stuffing purposes has been no less successful; the cost being one-third that of horsehair, and its resemblance so great, that it has been affirmed that when employed in furniture, the most experienced upholsterer could not tell the difference. When spun and woven, the thread resembles that of hemp, is very strong, and may be advantageously employed for many of the purposes for which hemp is used. From this "Forest-wool yarn" are now manufactured jackets, spencers, drawers, and stockings of every description; flannel and twill for shirts, coverlids, body and chest warmers, and knitting yarn. These manufactures are recommended for keeping the body warm without heating, and are very durable.

In the preparation of the wool, an ethereal oil is produced, which is at first green, but on exposure to sunlight becomes of an orange yellow tint, and when distilled colourless. It has been successfully employed as a curative agent. It burns in lamps like olive oil, and completely dissolves caoutchouc. The perfumers of Paris are stated to be employing it in considerable quantities. The liquid left by the decoction of pine-leaves is employed in the medicinal bath. The membranous substance and refuse are compressed into blocks and used as fuel; from the resinous matter they contain, they produce sufficient gas for the lighting of the factory in which the production of these useful articles is carried on. The result of one hundred quintals of wool in combustible material is equal in value to six cubic metres of pine-wood.

The Forest-wool ware manufactory at Remda in the Thuringer-wald advertises Forest-wool, oil, spirits, wadding, and the other articles already enumerated. Whether these deserve or not all the high encomiums that have been passed upon them, it is nevertheless an important fact that a material before considered useless is now converted into articles of domestic utility and commercial importance.—*The Technologist.*

OLEUM GOSSYPII—(COTTON-SEED OIL).

BY WILLIAM HENRY WEATHERLY, OF FREEHOLD, N.J.

(An Inaugural Essay presented to the Philadelphia College of Pharmacy, 1861.)

The oil of the seeds of Gossypium herbaceum, and other species of the genus.

Sex. Syst.—Monadelphia Polyandria. *Nat. Ord.*—Malvaceæ.

This is a biennial or triennial plant, and a native of Asia; it is extensively cultivated throughout the Southern and South-Western States, where it grows luxuriantly, frequently attaining a height of eight or ten feet, though it averages but five. With us it is an annual plant; the flowers, which are of a variety of colours, first appear in the month of June; the plant continuing to blossom until the growth of it is checked by frost. The root consists of a main spindle, ten to twenty inches in length, from which numerous rootlets branch off. The leaves are described as being "five-lobed, one glandular beneath; lobes round, mucronate, involucre serrate; stem smooth." At present the plant is cultivated, almost exclusively, for the fibre, which is found firmly attached to the seeds, but little use being made of any other portion. The picking season commences about the middle of August, lasting frequently as late as January; the fibre is stripped from the seeds by the process of ginning, and is packed in bales, by aid of a screw press, when it is ready for shipment. This fibre or "lint" is the only portion of the plant officinal in our materia medica. It is used as an application for recent burns and scalds, also in the preparation of collodion.

The root has been spoken of by several writers as possessing emmenagogue properties. It was also reported as being much in use among the slaves, for the purpose of producing abortion; this I believe to be wholly untrue. During a clerkship of eighteen months in one of the finest cotton-growing regions of the South, I made it a point to inquire into the truthfulness of this report. Not one of some twenty physicians whom I asked, knew of a single instance where it had been used for or produced this effect. I also inquired of a number of overseers on large plantations

whether they knew of an instance where the root had been used to produce abortion, but the information I acquired would in no wise substantiate this report.

That the root does possess emmenagogue properties, I do not presume to deny, but its efficacy as an "abortifacient," I certainly disbelieve.

The seeds as taken from the gin are of a greyish-brown colour, owing to the short down which still adheres to them; rub this off, and they are of a dark brown, almost black, colour. Though long known to contain a large amount of fixed oil, yet until within a few years but little has been manufactured from them. On the plantation, they are used chiefly as fodder for cows in the winter. The oil is obtained by expression, the process and apparatus being similar to that for obtaining linseed oil; the seeds are first deprived of their shells. Four qualities of this oil are found in our market—viz. crude, clarified, refined, and winter bleached. The crude constitutes the oil just as it runs from the mill; it is thick, has a muddy appearance, and deposits upon standing a portion of its impurities. The clarified is comparatively pure, of a deep orange colour, and quite limpid. The refined is a very pure oil, not quite so dark coloured as the clarified, and very limpid. The winter bleached is of a pale straw colour, has rather an earthy, though not very strong odour, and a sweet, bland, nut-oil taste, not dissimilar to that of sweet almond oil. The process of refining the crude oil is at present a secret among the manufacturers, so I am unable to give any account of it. The shelled seed yield about two gallons of crude oil to the bushel, and forty-five per cent. of oil cake. At Mobile, the seed as it comes from the gin can be bought for twenty-five or thirty cents a bushel; here at the mill, shelled, it is worth one dollar. The crude oil sells for fifty, the clarified sixty, the refined seventy, and the winter bleached eighty cents a gallon.

Cotton-seed oil is largely consumed in the manufacture of woollen goods, and is said to answer equally as well as any oil now in use. It is also adapted to the use of morocco dressers, by whom, I am informed, it is extensively employed. I learn also from good authority, that it makes a very fine soap, and is used by the fancy soap manufacturers for that purpose. Although said to be a drying oil, my experience goes to prove it is a very poor one. Last summer, we retailed a large quantity of it to the planters for the purpose of oiling their gins, and they found it to answer admirably. We also used it in place of lard oil for lighting the store, and found it to give equally as clear and brilliant a light. The low price at which this oil can be procured, and a knowledge of the immense amount of seed (now put to so little purpose) which might be bought up and manufactured into oil, are the inducements which led me to choose it as a subject for my thesis. The following experiments were conducted with a view of ascertaining how far it is capable of substitution for the more expensive oils in our pharmaceutical preparations:—The first made with it was unguentum aquæ rosæ, substituting it for oil of almonds; it made a perfectly smooth, white ointment, no way inferior to the officinal, and keeping equally as well. The second was ceratum plumbi subacetatis, substituting it for olive oil; the result was quite as satisfactory as the first. It made a much whiter cerate than the officinal, which generally has a greenish cast. I kept a specimen of this on hand several months without its undergoing any perceptible change. The third was unguentum hydrargyri nitratis, substituting it for neatsfoot oil; the result was a perfectly smooth, uniform ointment, of a rich orange colour, and of proper consistence. In making the ointment it was found necessary not to heat the oil and lard too hot, else, upon adding the nitrate of mercury, a deposit of a soft resinous consistence will be thrown down, evidently containing a portion of the mercury. Then, again, if the oil be too cold, no effervescence will occur upon adding the nitrate of mercury, and it will be found to remain too soft, almost liquid. I think citrine ointment, carefully made from this oil, will be found to keep its original colour and consistence a great length of time. The fourth preparation made with it was emplastrum plumbi; for this some very pure litharge was procured, and the operation conducted with a great amount of care, but (though the result was a perfectly uniform plaster, in which every particle of the litharge was combined) it would not acquire the proper consistence.

It was also substituted for olive oil in ceratum cetacei, linimentum ammoniæ, and l. camphoræ, making in each instance a preparation quite equal to the officinal. I learn from a reliable source that olive oil is largely adulterated with cotton-seed oil. A friend of mine, largely engaged in the manufacture of plasters, purchased several

casks of olive oil, which he found to be entirely unfit for his purpose, and, upon examining it, was satisfied that about two-thirds of it consisted of cotton-seed oil. The specimen of oil with which the preceding experiments were performed is the winter bleached. Its specific gravity is .921; it is insoluble in alcohol, soluble in chloroform in all proportions, and in not less than its own bulk of ether. Sulphuric acid turns it of a deep red colour, almost a brown. Nitric and hydrochloric acids have no effect upon it, either hot or cold. If the oil be heated much above its boiling point, it will take fire, and burn with a dull reddish flame, giving off but little smoke; and, if the heat is removed, the colour of the flame will gradually change to a pale blue, similar to that of burning alcohol, and finally die out, leaving part of the oil unconsumed.

Though my facilities for experimenting, and the number of experiments performed, were necessarily limited, yet I think they are sufficient to prove that this oil would make a valuable addition to our officinal list. Here we have a domestic oil, which can be purchased pure (there being no inducement to adulterate it) at about one-half the price of olive oil; and I see no reason why we should not make use of it in every instance where it is capable of being substituted for that oil, instead of paying an exorbitant price for what we do not get; as all will admit, two-thirds of our olive oil is adulterated.—*American Journal of Pharmacy.*

TURPENTINE AS AN ANÆSTHETIC.

Mr. John Wilmshurst, M.R.C.S., in a communication to the *Lancet*, March 2, recommends the use of rectified oil of turpentine as an anæsthetic.

Mr. Wilmshurst observes:—"The first case in which I tried its effect was that of Mrs. H——, matron on board the emigrant ship Indiana, of which I was then surgeon-superintendent. About twelve months ago, having exhausted my little stock of chloroform, and the patient suffering from violent neuralgia in the course of the supraorbital nerve, it occurred to me that of the remedies at hand the most likely would be the vapour of turpentine. This I immediately applied, sprinkled on a handkerchief, to the nostrils, similarly to chloroform, and was surprised to find it not merely soothe and allay the pain, but, after a few inhalations, produce a gentle sleep and state of anæsthesia, from which she awoke without any headache or other unpleasant symptoms, and quite free from pain. I may mention, without going into detail, that I have since tried it in one or two slight but painful operations—as extracting a broken needle from a sensitive part, and in some cases of cramp, convulsions, nephralgia, calculosa, &c. Its effect seems to be to allay nervous irritation, spasm, and pain, without deranging the action of the heart, and to produce a calm anæsthetic sleep. The remedy being simple, inexpensive, and easy of application, will, I trust, induce some of your numerous readers, more skilled and with better opportunities of testing its value, to experiment in the direction I have indicated, and to publish the result for the benefit of suffering humanity."

TRIFOLIUM IN FŒNO A REMEDY FOR HOOPING-COUGH.

Mr. Foster, of Huntingdon, in a letter to the *Medical Times and Gazette*, of May 25th, recommends the use of the above remedy in hooping-cough. The following formulæ are given:—The infusion:—℞ Trifolii in fœno, ℥ij.; aquæ bullient., Oj.; macerate for four hours and then strain. For a child of five years, take a tablespoonful three times a day. The Syrup:—℞ Trifolii in fœno, ℥ij.ss.; sacch. cand., ℥ij.; aq. bullient., Oj.; macerate the hay in the water for an hour with gentle heat, then boil down to proper consistence. For a child of five years, take two teaspoonfuls four times a day.—*Medical Times and Gazette.*

CORRESPONDENCE RELATING TO THE PROGRESS OF THE SOCIETY.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—The present circumstances of our Society deserve from its members their best and most careful consideration. The late expenditure of capital, and the inroads made yearly by death upon our numbers on the one hand, and the extension of premises and the establishment of the capacious and complete laboratory on the other, will convince the thoughtful that we have entered upon another stage in our existence as a Society, and must either decidedly advance or prepare to decline. With limited expenditure and ample reserve we might formerly have been content to offer advantages to the few; we must now, more than ever, seek to benefit and to stamp our character upon the many. The changes which are under the consideration of the Council, and which, if approved by them, must be brought before the Society at large before they can be adopted, are very important, and it is very necessary that the reasons for them should be clearly understood before the decision is made. As far as I have heard them, they seem to me to be wise measures, and well calculated to bring about that advantage to all connected with the Society, which, I am sure, we desire to see. There are several misconceptions which I notice in the letters of your correspondents and in the speeches at the annual meeting, and I have troubled you with this letter in the hope of correcting some of them.

What, then, are the business advantages, which, apart from a generous desire to promote the advancement of Pharmacy, may induce men, whether in business or preparing for it, to connect themselves with this Society? They are chiefly two—the hope of Parliamentary enactments in our favour, and the recognition by the public of the superiority of the title "Pharmaceutical Chemist" over every similar one. Now, one of the greatest hindrances to both of these, is the fact that there are still a great many Chemists of high standing, acquirements, and respectability, who, from various causes, do not belong to our body. Only attempt to give exclusive privileges *by law* to Pharmaceutical Chemists, and you will at once have all the trade who do not belong to us, joined in opposition to defend themselves from what they would regard as an injury to their own business. They will apply to their various representatives, and what chance, let me ask, would there be of obtaining such a law, when they could point to men among them in every respect our equals—men whom our members themselves elect, and join with in their local chemists' associations, and could ask on what grounds such men should have the brand of inferiority impressed upon them. We must remember that the Legislature does not see with our eyes; it has to regard the interests of all, and exclusive privileges are granted with reluctance, even when the advantage is undeniable. If we were able to say, "The whole body of respectable Chemists will be found within our ranks, the exceptions are so few as not practically to affect our boast," then we may have some chance of legislative favour, and every step we can take with propriety towards this consummation, is a step in advance indeed. And what prospect is there of a speedy public recognition of the superiority of the title Pharmaceutical Chemist, so long as many of the longest established, most respectable, and most influential shops of a neighbourhood have the titles of dispensing chemist, operative chemist, &c., and this, not in obscure country towns, but in the chosen resorts of wealth and intelligence? In the metropolis, in the great provincial towns and cities, in the sea-side homes of the wealthy and health-seeking, you may continually find chemists of the best repute who do not exhibit the tokens of membership with us. And how can the public be expected to prefer the shop which bears the title Pharmaceutical Chemist, when they see near at hand the establishment of a better man, perhaps, which does not bear it? These men will not submit to examination, and it is not reasonable to expect it. They have long conducted their business with honour, they have won their present position, and will not ask leave of any to retain it. They would be willing to join us as equals, if the door were opened, and if not, they will remain outside, the most formidable obstacles to our progress. Now, the Council

seek to have the power of admitting, not all, but such as, upon inquiry, they may deem suitable from among those who were in business before the passing of the Act, and who might therefore have been admitted before, and thus convert formidable opponents into valuable friends. To represent the Council, therefore, as seeking to admit all, whether qualified or not, is simply a misrepresentation not very creditable to those who make it. Nor is it to the purpose to say that these men have no claim, that they excluded themselves, &c. It is not because they prefer a claim that they are to be admitted, but because *we* want them, their union benefits *us*, their separation is the very thing that hinders the educated and examined associate from reaping the fair profit of his studies, and makes the name he has won less valuable than it ought to be. The certificate *by examination* would still remain as a superior honour, and none ought to rejoice more at a step which would convert rivals into helpers and friends than the young students of this Society.

There is a remark made by a major associate in your last number which deserves notice. He says that assistants who are not connected with the Society are preferred, sometimes even by the examiners themselves. If so, the fault must be with the young men. Such should have the good sense to remember that the chief business of a retail Chemist is to sell drugs and chemicals, and to make up prescriptions, and to do this with such diligence and courtesy and attention to the wishes and even the whims of his customers, as shall retain their support in the face of severe competition. The young man who, on the strength of some scientific knowledge, forgets all this, and sports his moustache, and is above aprons, and has a great objection to dirt his fingers, is one whom a good man of business will take care not to give house room to, at any salary whatever. One other book, at least, should have been studied: Franklin's *Maxims of poor Richard.* But let a young man remember that he is a "Tradesman," however educated, and that it will be both his duty and his honour in every right way to secure the success of his employer's business, and there is no danger of his merits being overlooked or his salary being curtailed by any one who may be fortunate enough to secure his services.

I am, Sir, yours obediently,
OPIFEX.

TO THE EDITORS OF THE PHARMACEUTICAL JOURNAL.

GENTLEMEN,—Permit me to address a few remarks to you upon one of the propositions (made by the Council) for maintaining the funds of the Society.

First, however, expressing my sense of the valuable services which have been rendered, not only to the members, but to the whole body of Chemists, by the arduous labours of the various Councils. Judging by the speech of Mr. Morson, the proposal most favoured by the Council appears to be the one to admit as members those in business prior to 1853; or rather such of them as desire admission.

Had we succeeded in obtaining a compulsory Act, the justice of admitting all in business at the date of its coming into operation would be seen by every one. But such is not the case; we are a voluntary Society, unendowed with compulsory powers, and have repeatedly stated that the only path to membership was by passing the examinations instituted and conducted by our Council. This course has only once been broken through—viz. in 1852, for which—though, in the opinion of many, an unadvisable proceeding—there was considerable excuse.

It is seriously to be apprehended that a second admission—in our present circumstances—of persons in business prior to 1853 will greatly weaken the confidence of many young men in the good faith of the Society.

Whenever we apply to the Legislature for a compulsory Act, inquiry will naturally be made into our proceedings during former years. If it should appear that whilst we have carefully conducted a series of examinations, rejecting those unfit to pass, and stating that we should refuse admission to membership except by passing these said examinations, we have occasionally broken our word by admitting every few years those who either had not attempted to pass, or, having attempted, had failed, but who "*were very desirous* to join the Society," the Legislature would, in all probability, say our proceedings were very strange, and that we scarcely seemed fit to be trusted.

Again, is it fair that those who have hindered the operations of the Society by ridiculing its efforts, or, *at least*, by standing aloof, should be admitted upon easier terms and to equal honours with those who have borne the burden in the day of adversity, or who have passed the examinations of the Society? Many of these gentlemen have seen the Society rising in influence, usefulness, and esteem, despite their standing apart, and now desire that a portion of these honours should be shared by themselves.

It is stated that admission will be guarded by duly signed certificates of fitness, &c. This sounds well, but we all know how easily signatures to testimonials are obtained—*e. g.* the notorious Close testimonial for pension—and how unpleasant it would be to refuse to sign on behalf of such as would ordinarily present the form.

We should probably feel no hesitation in refusing to recommend an applicant who was a dealer in drugs and red herrings, cheese and ribbons, but we could not help feeling awkwardly placed when solicited on behalf of some one of average standing as a tradesman, but scarcely possessing a vestige of scientific information, and "no intentions that way," who is muddy on "bi" and "hypo," oblivious of troy weight, and whose desire to possess the cabalistic M.P.S. arises from a conviction that the sale of his "Liver and Wind Pills," price 1*s.* 1½*d.*, would thereby be greatly increased.

Now, whilst it is quite legitimate to sell "liver and wind" pills even at 1*s.* 1½*d.* per box, it is by no means clear that a desire for a larger sale forms a qualification for membership. Mr. Morson says, "Let the examined show their certificates." If this hold good now, it would hold good in another ten years; but it is not probable the public would take the notice and make the distinction supposed, but rather that they would infer the possession of similar certificates by all who only exhibited "the pretty picture."

Moreover, a feeling of modesty would prevent many from thus calling the attention of all passers-by to their accomplishments.

We aim at compulsory legislation; this we know will be difficult to obtain, but our success will be materially accelerated by the proper use of the increased and increasing advantages held out by the Pharmaceutical Society, the high and improving character of the examinations, and by unswerving justice in the fulfilment of our pledges.

Masters must take care to press upon their assistants, and the parents of their apprentices, the advisability and importance of passing the examinations of the Society.

Time for study must be afforded the young men, either by early closing or by allowing half a day per week.

Assistants must do their part by making good use of the opportunities offered them.

It is to be hoped the Council will discover a more suitable plan for avoiding the apparently impending financial difficulty.

The increasing number of candidates for examination—so large, indeed, as to necessitate some alteration in the arrangements—affords a prospect, that with the additional proceeds resulting from such minor alteration as may be seen fit to be made, the funds will be maintained in a healthy condition.

I remain, Gentlemen, yours respectfully,

Rochdale, June 17th, 1861. HENRY BOOTH.

TO THE EDITORS OF THE PHARMACEUTICAL JOURNAL.

GENTLEMEN,—In reading over the address of our worthy President at the twentieth anniversary of the Society, I was not a little surprised to find a somewhat earnest plea put in for those who are the outsiders of our useful Society.

Twenty years have passed away since the first link of the chain which was to bring Chemists and Druggists into one united body was formed. Difficulties, as a matter of course, and many of them too, were strewed along the pathway of its onward and upward march to consolidation. Concessions, then, were necessary, in order to accomplish the much-to-be-desired object. Very properly, the doors were thrown wide open, to receive all who were ready to enter on the offered conditions.

Many did enter, and very useful as well as praiseworthy were their efforts to elevate and improve the conditions of their brethren in trade.

Progression in that day was the *true* motto, and as time rolled on, numbers more rallied around the uplifted standard, and added their names to the long list of volunteers who were embarking in this enterprise of social and scientific advancement.

Notwithstanding the fair and almost certain probabilities of ultimate success, many shrink back and decline to join the ranks. The door is closed, but not finally barred. No sooner is it seen that advantage is likely to accrue from this combination of forces, than these *hesitant* ones knock for admittance, for there is a distant murmur that an Act of Parliament is likely to pass which will effectually shut them out if they do not advance, and that without delay.

Very kindly, and *perhaps* justly, the door is again thrown open, and both principals and assistants are admitted to the common privilege of their previously enrolled brethren. Bye-laws are then drawn up, for the Act has passed; notice is given out that none can now be admitted without examination; and the door is finally closed.

Eighteen hundred and sixty-one has witnessed a change in the aspect of things. "Are we progressing?" says one. "No doubt about it," replies the querist; "it *must* be so." Is it so? Some of us entertain grave doubts upon the matter, and especially so when it becomes necessary to call in "outsiders" to save us from incipient decay and ignoble ruin.

And now, let me ask you, Sirs, is it fair—nay, more, is it common justice, to members already enrolled and major associates, too, who have borne the heat and burden of the day—to make such alterations in existing bye-laws, as to allow those who have hitherto been careless spectators to enter and stand upon the same level, just because a good result is likely to arise from connexion with an authorized and well-established Society? ! ! ! Progress, indeed. Such a proposition is rather a sign of weakness and declension; and because, forsooth, a little more capital is required, in order to ensure the well-being of the Society, is the first attempt to realize it to be stratagem and meanness? Are we now to say, there was a time when we wouldn't have you, but just now we want money, so come along. Is it so? Has the last spark of true generosity died out, and left us powerless, and shivering, and cold, for the want of means to keep us in movement? I trow not. The proposition is to my mind one of ill-timed and short-sighted policy, and I for one must enter my protest against such a flagrant departure from all justice and rectitude.

Fully and cordially do I agree that we should keep pace with the times—that we should be progressive—that laws which have become obsolete should be altered; but on no account let us fall back upon the old dull conservatism, which is rather retrogressive than otherwise. If the bye-law which has reference to the admission of members be altered, how in common fairness can you exclude those who, although not in business for themselves, yet hold responsible positions in the establishments of employers where their services are appreciated, whose competency cannot be denied, but who are not in a position to undergo the requisite examination to entitle them to the privilege of membership—how, I say, can you exclude them, and admit others whose competence may be doubted, and yet be just?

And if the doors be again thrown open as before, what will the examined members and the older members of the Society think of the wisdom, if such it can be called, of those in power? Is it not likely to excite feelings of disgust and want of confidence? This objection in some form appears already to have been raised, and it is attempted to be met by what some may be disposed to call a somewhat sarcastic proposition. "Let," says the speaker, "the examined members rely on their certificate of examination, and display that, instead of the very pretty picture which the other members have to show"—a hint, by the way, that it is not worth much after all. The worthy gentleman has evidently forgotten that the public eye has a great weakness for things "in the picture line," and are far more likely to be satisfied with the manly forms and floral collection of the present "very pretty picture," than be struck by the meagre and insignificant appearance of the cer-

tificates of examination. And, after all, it is only the more enlightened public who make it their business to discern between things that differ.

I quite concur in the remark of one of the speakers at the meeting, "that it *is a great mistake* to suppose there are hundreds of good men outside who are anxious to be admitted into the Society." If there are hundreds of these good men outside, I am sure it is a misnomer to call them good, and their names ought at once to be changed to *good-for-nothing* men, for having remained so long aloof, and not stepping forward to help in a good cause, when their services could have been best appreciated. If the Council really find that the admission of examined Associates, &c., by the newly adopted means, does not answer so well as the former one, why not alter such arrangements, and charge the annual subscription in addition to a *somewhat reduced* admission fee? On no account let us resort to an expedient which is not only unfair, but without precedent. The Apothecaries' Company, College of Surgeons, or Universities, have not relaxed since the passing of their Acts and arrangements; why, then, should the Pharmaceutical Society be the first to set up a bad example?

You may depend upon it, Sirs, if these outsiders, who are said to knock for admission on easy terms, were good for anything, they would have joined the ranks long ago, and not have remained silent spectators until *self-interest* bade them come forward and claim a slice from the ripening apple of progress.

One would really think that all our chivalry has died out, and that we cannot help one another when a difficulty arises; and I see no reason why the pecuniary interests of the Society cannot be sustained by those who are already connected with it, without resorting to the practice of letting men in by stealth. I have only to request that you will insert the above remarks in your Journal, and remain,

Yours respectfully,

Bristol, June 18, 1861. G. G. Hornsby.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—I cannot help thinking that the Annual Meeting was somewhat negligent in granting to the Council a discretionary power to admit members without examination, before a distinct understanding had been arrived at, and a plan laid down limiting the exercise of a power which, if abused, would, I am confident, injure the present standing of the Society, and estrange from it the bulk of the examined members.

The cases to which it would be advisable to accord the privilege are, I believe, very few in number, though very many persons may desire to enter on terms so easy, but whose admission would inflict a great injustice on a large class who, only by dint of labour and expenditure of time and money, could obtain the same position, and entitle themselves to what they fondly hoped would some day be considered an honourable distinction.

The pretty pictures Mr. Morson refers to are, I believe, equally esteemed by their possessors and the public; mine, at least, has been consigned to the lumber-room, and will there remain until its exhibition is likely to be appreciated: a far distant day, if every two years the door is to be opened and gentlemen without scientific qualification admitted on mere payment of fees.

I am afraid jealousy has something to do with this; the Pharmaceutical Society bidding for patronage against the United Society.

This would be very unworthy our position, and unnecessarily hostile to the United Society.

What limitations should then be observed? I will suggest two:—

1st. Admit none of less age than 45 years, and that have not served a regular apprenticeship. Younger men can apply themselves to study, and, without loss of dignity, submit to be examined by men older and abler than themselves.

2nd. Those admitted should be pure Pharmaceutists, *i.e.*, not mixing physic with grocery, &c.

If some such cautions be observed the base of the Society may be somewhat enlarged

and its income improved without wronging any one, but should the contrary be the case, a large defection of examined annual members may be expected, and among them

Your obedient servant,

Weymouth. THOS. B. GROVES, M.P.S., &c.

ARE WE PROGRESSING?

"And awake your senses, that you may the better judge."

I WAS inclined, rather tardily I must own, to challenge a subject which appears to have now taken a fixed hold on the minds of some of the leading members of our Society, from having called at the establishment, a short time since, of one of our Council, respecting a medicine which it appeared had been rather fully dwelt upon in the pages of the month's Journal. The answer I received naturally was, "Why don't you read your Journals?" I was thrown into confusion, and from having felt a lukewarmness in the Society and its concerns since its last deviation from the bye-laws, I was roused to a sense of the existence of a body with which I was connected; went home, and read the Journals.

I found that just the same subject was under discussion that I had taken up something more than three years ago, when I embodied my views on the prospects of the Society in a letter to the Editor of the Journal, and subsequently had the pleasure of an interview with him concerning it at his residence in Langham Place, when he was of opinion that it would not be for the interests of the Society that my communication should be inserted. I thought, and still think, that the sooner a question, which must force itself upon us in the end, is ventilated, the better results are likely to accrue; and in viewing the efficiency of the Pharmacy Act we should not be thought in the slightest degree to disparage, or take from the respect, which we all owe as a body, to the memory of the late Mr. Jacob Bell.

> "His life was gentle; and the elements
> So mixed in him, that Nature might stand up,
> And say to all the world, This was a man!"

He did all he could, all that perseverance and money could do, for the advancement of Pharmacy in this country; he knew that the work he had pushed forward with such zeal was but in its infancy; but he had one error, common to all men: he thought more highly of his own offspring, the Pharmacy Act, than he ought to have thought.

Taking up the spirit of the census: Is it not a criterion of weakness in a nation when its people stop to inquire of one another: Are we progressing? Or the alternative: Are we going back? Would not progression be self-evident if it were so? Will it not equally apply to us? Can we say we are progressing, when we have the Council telling us the astounding fact that some means must be devised for increasing our revenue or we shall obviously come to a stand-still, from the simple fact of our old members dying out and an equivalent of new members not arising in their place under the new system? Our very existence is threatened; and, in the face of this, some of our body have the temerity to answer the question, Are we progressing? in the affirmative.

It is not necessary for us to go into the question statistically to be more than sure that the members who have passed their major examinations year by year are obviously insufficient to supply the country with Pharmaceutical Chemists, and this is the test of the Pharmacy Act, and no other.

What avails it that we sacrifice our honour on the shrine of expediency, and bolster up the Society by the admission of 600 paltry outsiders, who have never hitherto thought that the status, which other men have purchased at, to say the least of it, the unpleasant process of two or three examinations, worth to them a guinea a year? And this is but a temporary relief to our pecuniary crisis; all men must die, and Chemists have no immunity from the common lot; there is no elixir vitæ concentrated in the retorts of our laboratories at Bloomsbury Square for the special benefit of our members; drowning men catch at a straw; but we have an alternative: the Pharmacy Act is insufficient for our maintenance as a body, insufficient for the

requirements of the public, and insufficient for our individual status. Professional education, to be successful, must be, and is, in all countries, and our own as well, protected; let us look the matter boldly in the face, let us have a compulsory Act ready for next session of Parliament; if we are not successful, let us be ready again, and agitate, agitate, till we get what we require, and must have in its integrity. To prosecute such a course as this, I may say, from my own feelings, there would be no lack of funds; Pharmaceutists would not measure their subscriptions by their French kid gloves or their operatic diversions, neither would they sit in their easy-chairs to watch the progress of events.

I am indebted for these poetic similes to your correspondent, whose letter I should like to see enrolled amongst the manuscripts of the British Museum, for the benefit of future generations of wondering and envying Pharmaceutists; for my own part, I have always considered the Chemists as a patient, persevering race, and the last of her Majesty's subjects to be specially associated with operatic indulgences, particularly easy-chairs and voluptuous manual contrivances.

Again, your correspondent says, "He has now arrived at a point which was a powerful incentive in the formation of the Pharmaceutical Society—namely, the establishing of a race of Pharmaceutists equal to any on the Continent, and worthy of a great country." This question he does not appear to be able to resolve; but I think, from a residence abroad and intimate connexion with foreign Pharmacies, I can decidedly state that in France, Italy, and Germany, every Pharmacien is a legally qualified man, and responsible to his Government for the Pharmacy over which he has jurisdiction; the examinations are infinitely more scientific than ours, and, consequently, were our Chemists all qualified, instead of not one-tenth of them, the foreign Pharmaceutists would, one may presume, be men, as a body, of greater acquirements than ourselves.

Be assured of this, that the Society must be able to hold out some further inducement for men to graduate themselves by its examinations than the rather negative one "that scientific knowledge is of the greatest importance in the proper selection of teas, coffees, sugars, colours, oils, and sponges."

Lastly, would it not be a valuable suggestion to preface the announcement that members are to be created again without examination, with some such popular incentive as the following?—Positively your last opportunity, or, the last chance but one. And now, for the nonce, I think I have appropriated a sufficient space in the pages of our Journal, but perhaps you may hear from me again on this matter.

Richmond, S.W., June 19th, 1861. T. S. Hopwood.

OUR PAST AND FUTURE PROGRESS.

The question, "Are we progressing?" has already been asked, and written upon in this Journal, but I beg to submit that, in order to understand the question aright, we must consider our position some twenty or thirty years ago, and compare it with our present position, and by so doing we shall see the progress that has been made.

Previous to the establishment of the Pharmaceutical Society the science of Pharmacy in Great Britain lay enshrouded in the darkest and gloomiest night. The Chemists and Druggists of that day, with but few exceptions, were mere traders, but little removed from grocers. They knew nothing of Chemistry, not even the chemical composition of the various salts which daily passed through their hands. Botany was almost unheard of, and Materia Medica may be said to have had no existence. It is a fact, and shows the profound ignorance of that day, that isinglass was supposed to be dug up, and that orders have been sent to London for chloride of sodium ! ! ! This is a short and sad, but nevertheless true, picture of the Egyptian darkness which overshadowed Pharmacy in Great Britain, whilst in most other civilized countries it was full of life, and teeming with discoveries of the greatest importance to the welfare of society at large.

Fortunately, however, other and brighter days were in store for it here; all other arts and sciences were making rapid strides, and the science of Pharmacy could no longer remain in this chaos of ignorance. The Chemists and Druggists, already

excited by threatened legislative interference, became sensibly alive to their own miserable failings, and the result was the formation of the Pharmaceutical Society, "for the purpose of advancing Chemistry and Pharmacy, and promoting a uniform system of education for those who should practise the same, and also for the protection of those who carry on the business of Chemists and Druggists." These were the fundamental principles of a Society, which came like a redeeming angel to rescue Pharmacy and Chemistry from its degraded position; and now, after the lapse of twenty years, the impartial observer, upon. calmly looking around, will come to the conclusion that all the objects contemplated have been achieved, as far as time itself and the Legislature would permit. During this short time it has gone on steadily and boldly in the path of progress, and its advance, without doubt, has been unparalleled.

Early in its career it obtained a Royal Charter, consolidating the previously scattered and disorganized Chemists and Druggists into a regular organized and recognized body.

It established a museum, a library, and a monthly Journal (which is supplied free to members, associates, and apprentices) teeming with scientific, technical, and useful information.

It has stood boldly and successfully forward as the advocate of the just claims of Chemists and Druggists, has fought the battle and successfully resisted attempted enroachments, as instanced by the late Poison Bill. It has established a school of Pharmacy, with a laboratory unsurpassed in England, if in Europe. It has obtained an Act of Parliament which makes it compulsory upon all future Pharmaceutical Chemists to pass the examinations, and of so much importance are these considered by the Government that only those who have at least passed the minor are admitted as dispensers in the army.

It has raised, and still continues to raise, our status and respectability as a body, by sending forth to the world, in the practice of Pharmacy, a class of educated men who have passed some most searching examinations. One proof of this last statement, if proof were wanting, is to be found in the fact that we are taking, and are quite worthy and qualified to take, our part in the compilation of the new National Pharmacopœia.

It has, I know, been stated that "we are progressing but slowly, if at all," and the only proof of this statement brought forward is, that some Chemists and Druggists have dispensed two dozen powders, each containing half a grain of acetate of morphia, with other ingredients, for one shilling. Now, granting the lady's statement to be correct, I don't see that this "breeches-pocket" view of the case has much to do with our progress. Undoubtedly, if the Legislature had passed the Society's Bill without erasing its most important provision, the evil complained of by Mr. Collins would not, after some time, have existed; for all would then have felt that it was not a fair compensation for an expensive article, and for the time and money spent in acquiring the necessary professional knowledge. If this case proves anything, it proves merely that we have not yet obtained the ultimatum of our desires—a compulsory Pharmacy Act; it does not by any means prove that we have made none, or but little, progress.

The root of the evil lies in the present system of things, which allows errand-boys from surgeons with a slight smattering of knowledge, and apprentices from shops where grocery is the rule and drugs the exception, to compete with regularly apprenticed, educated, and qualified assistants, who have nobly and honourably spent their time and money, and passed the examinations creditably. Even at a step further, the law aids us not, and the same individuals, with a great amount of presumption and a very little stock of knowledge, are allowed to compete with the educated Pharmaceutical Chemist, although it must be said that they dare not take any sign or title implying that they belong to the Society.

Although not agreeing with Mr. Collins that Pharmaceutical Chemists and assistants are not better paid now than they used to be, it must nevertheless be patent to all, that as long as the practice of Pharmacy is open to these illiterate ones, it will be still somewhat degraded (in proportion to their number) to the level of an ordinary trade, and it will be impossible for it to assume its legitimate position.

The present age has truly been characterized as the age of progress; the watch-word inscribed upon every banner is "Forward! Forward!" and upon scanning

this rough outline of our past progress, it will be seen much, very much, has been done, yet nevertheless we dare not stand still, we must go forward. Already the Council is agitated, and is debating the question of the admission of all regular Chemists and Druggists without examination ; and is not, therefore, the present a favourable opportunity for again applying to the Legislature for further powers, or, at any rate, for commencing the agitation? I look upon the day as not far distant —already I think it is dawning—when the Legislature will be willing to make it compulsory upon all future Chemists and Druggists to pass the examinations, and to hold the diploma of the Society.

All persons in business at the passing of the Act to be registered by the Society upon payment of an annual fee, and bringing proofs satisfactory to the Council of being *boná fide* Chemists and Druggists.

The sale of poisons and drugs to be restricted to the Society—that is to say, the old members, the new registered members, and the members by examination ; the Council having power, with the sanction of the Secretary of State, to make bye-laws binding upon all as regards the sale or safe keeping of any poison or poisons.

Only by a sweeping measure something of this kind here shadowed forth, can the neglected science of Pharmacy be restored to its just position, and its followers enabled to take rank and vie with those of France, Germany, or any other country.

Wilton. AN ASSOCIATE.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—No doubt many highly respectable and well-educated Chemists and Druggists will avail themselves of the opportunity afforded to become Members of the Pharmaceutical Society under the proposed or suggested alterations, according to a resolution carried at your last Council Meeting, and I am of opinion, that if carried into effect, it will prove a wise and liberal act on the part of the Society, and will greatly enhance the value of the Society, inasmuch as many members will join that would hold aloof under existing circumstances.

I am quite alive to the importance of acting cautiously in making these alterations, for we cannot hope that Members who have been subscribers from an early period of the Society, or those who may have become members by examination, will look upon the question with complacency or indifference, and they probably may feel some little delicacy or jealousy in opening the portals of the Society once more, so as to enable those to enter who from *many causes* may have been prevented from joining the Society in 1853, and it is to be hoped that hundreds will now come forward, and add strength to a Society which must eventually lead the van of pharmaceutical science in this country, and be a conservative influence against the increasing imposture of quackery and incapacity. Circumstances over which I had scarcely any control prevented my taking up my membership in 1853 (although elected), and the time allowed was too short to enable me to take advantage of that clause till too late, and though I feel myself fully competent to undergo an examination to obtain a membership, yet I feel also that my position in business, and the length of time I have been in business, entitle me to some consideration, and should the suggested resolution pass into law, I beg to tender my name as a joining member of the Pharmaceutical Society; and I would suggest to others who were prevented joining the Society before, to come forward and support the arguments of the proposer and seconder of this important resolution.

I remain respectfully yours,

EDWARD R. HORNBY.

York Street Chemical Works, Gold and Silver Refinery, and 13 *High Street, Sheffield, June* 21, 1861.

PHARMACY IN MANCHESTER.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—As the remarks in the accompanying letter apply to the usages of the trade generally, their insertion in the Journal may tend to further the object con-

templated—reference is made to the absence of any late reports of the Manchester Pharmaceutical Association's Transactions—that there has been such a Society is evident (the last published account is respecting the Jacob Bell Memorial Fund,) but its existence now is doubtful. Can any Member explain its state?

I see no cause why, in our important city, the capital of the manufacturing district, studded with halls of science, art, and commerce, vying in magnificence, and surpassing in influence and benefit many of the bygone nations' wonders, we should have neither a College nor a spare room of an Institute to represent Pharmacy. There appears to be a cordial and unjealous feeling existing amongst the principal chemists—probably as high-class establishments as any in London. 'Tis true that the "bazaar" style in new arrangements is in the ascendant, yet the general tone is good, and only requires organization to advance us a few steps in Pharmaceutical progress.

I feel confident the medical men of the city (than whom, I suppose, no higher class, nor more liberal in their professional character, exists in the kingdom) would assist in the re-formation and advancement of the Association; they do in many instances give their aid to field naturalists and Botanical Societies, and would with equal pleasure to Pharmacy. I am, Sir, yours respectfully,

Manchester, May 17th, 1861. H. J. W.

TO THE EDITOR OF THE MANCHESTER GUARDIAN.

Sir,—I am glad to find that the grievances of chemists are engaging a portion of the attention of the public, and hope some decided benefit will result from the discussion. As an ex-assistant, who has "roughed it" in the metropolis for many years, I can sympathize with those who are still under the yoke; but I do not believe the assistants in Manchester have such cause for complaint as those in London. Nevertheless, passing by what might be stated about London, let us suppose the case as mentioned by your correspondents. Daily hours of business from 8 A.M. until 9 P.M.; Sunday duty (in a dispensing business imperative, even with closed shop, and respectable chemists do close their shops entirely on Sundays) divided fairly betwixt employers and employed, in accordance with the rules of respective establishments.

I, for one, would willingly agree to close at eight, and should be glad to leave off work at that hour, but, unfortunately, the public will not allow us to finish by nine —'tis not unusual to be engaged, completing late orders, until ten o'clock. The public can help the movement by forwarding their instructions for ordinary medicines early in the day. It is well understood that there are times when medicines must be supplied immediately, whatever the hour. Most chemists will allow their assistants a half-holiday weekly, many do so already; but I question any advantage in closing the shop; there must be some one in attendance, and probably, if closed, the employer would take the holiday himself and leave the assistant on duty.

From my own experience, I believe it to be better for each assistant to have part of every Sunday than the Sunday in and the Sunday out; the latter system is a bad one, and operates mischievously in both instances.

The chemist's position is peculiar, and assistants must give up many fanciful notions if they intend to succeed in their business. It is a laborious and ill-paid occupation at the best—requiring incessant application; and shortly, the more complete separation of the practice of medicine from the practice of pharmacy will necessitate a higher grade of scientific and general education than is enjoyed by a large class of chemists in this country. Let assistants and apprentices look to this, and if they succeed in shortening the hours of labour (which I have no doubt they will), let them endeavour to resuscitate from its burial-place the Manchester Pharmaceutical Association, which, according to the *Pharmaceutical Journal*, once held monthly meetings in the Royal Institution.—I am, Sir, yours repectfully,

An Employer.

LETTER FROM MR. VIZER.

[The following letter is inserted in compliance with the wish expressed in it, and the readers of the Journal are requested to compare the statement it contains with

the report of Mr. Vizer's remarks in our last number. We do not profess to give more than the substance of remarks made on such occasions, and often have to exercise a discretion when the judgment of the speaker is manifestly at fault.—Ed. Pharm. Journ.]

TO THE COUNCIL OF THE PHARMACEUTICAL SOCIETY.

Gentlemen,—You will, I trust, pardon my troubling you with a few lines, as I consider it but just to the members of our Society at large that any act of omission should be made known in order that it may be rectified. I am ignorant who the parties are who conduct the editorial duties connected with the Journal, but as I find that in the report of our last annual meeting the few words I addressed to the meeting have been so materially garbled that it is a matter of impossibility for any member not having been present to understand rightly the import of those remarks, while I find, on the other hand, that the defence (if I may so call it) is reported word for word, in justice to the members, I ask you to allow this letter to appear in your next month's Journal.

As near as my memory will carry me I will endeavour to repeat, in as few words as possible, what I then stated:—After referring to the heavy expenses of the past year and to the advisableness of the Council taking the management of the laboratory into their own hands, I referred the meeting to a paragraph in the report, which states that, "although from the necessarily great expense attending the laboratory course, they (the Council) do not think it practicable to make the laboratory a source of much pecuniary profit, yet they trust that, under the supervision of the Committee which is appointed for that purpose, it may be made to yield a fair interest on the capital invested." I then stated that a fact had lately come to my knowledge which, if allowed to pass, would tend materially to diminish the probability of the success of our laboratory, and, consequently, destroy the foundation of the hope expressed in the report.

The name of Braithwaite, I stated, was a name familiar to every member present; it is a name which will be handed down to posterity with ever-recurring feelings of gratitude for instruction received at that gentleman's hands; but circumstances had occurred, which, unless altered, would deprive the Society of the able services of this gentleman. It was true Mr. Braithwaite was a private servant in the service of the Professor, but I thought the meeting would concur with me in considering Mr. B. as also a "public benefactor," and in that light deserving public attention.

Mr. Braithwaite had been head assistant in the laboratory for the last thirteen years, during which time he had used his utmost energy and attention in advancing the interests of the pupils under his care. I understood that some time back this gentleman had applied for a higher salary, but from circumstances which had lately transpired, and which were known to the Council, it was found that two assistants would have to be kept in the laboratory; in consequence of which, the Professor had intimated that he could not afford to increase Mr. Braithwaite's salary, and as Mr. B. was now a married man with a family rising around him, it would be impossible for him to retain the position he now holds for so paltry a remuneration, and thus the Society would be deprived of this gentleman's able services. I therefore thought that if the Council considered the welfare of the Society, as well as the justice of the act, they would take the entire control of the laboratory into their own hands, pay the Professor for his lectures, and pay Mr. Braithwaite for his duties in the laboratory, independently of the Professor; they would then find that with judicious management the laboratory would not be altogether a losing investment, and the Society would not have to bear the reproach of having deserted a servant after thirteen years' active service of a most arduous nature.

I must apologise for the length of my letter, but as it is but right and just that both sides of the question should be fairly stated, in order that members unable to attend may know the truth, the whole truth, and nothing but the truth, I trust you will pardon the length of this statement of facts.

I am, Gentlemen, yours faithfully,

63, *Lupus Street, Belgravia, South.* Edwin B. Vizer.

MISCELLANEA.

Meteoric Stones.—A number of the *Institut* Journal supplies us with some recent cases of the fall of these mysterious visitors. At Trenzano, near Brescia, in Lombardy, there fell on the 12th of November, 1856, one which weighed 17 lbs. At Fort Peter, in the territory of Nebraska, North America, a piece of "meteoric iron" was found in 1858, weighing 30 lbs.; it was sent to the Academy at St. Louis. The museum at Austin, the capital of Texas, possesses a mass weighing 320 lbs., composed of 89.9 of iron and 10.1 of nickel; it is an object of superstitious veneration to the Indians. The same museum has a fragment of another aërolite, weighing 12½ lbs., consisting of 94 parts iron, 5½ nickel, with traces of cobalt. On the 1st of May, 1860, there was, in Ohio, actually a shower of aërolites, which fell with violent detonations in the three counties of Guernsey, Harrison, and Belmont. One block weighed 103 lbs.; several weighed from 40 lbs. to 60 lbs., and the weight of the whole was estimated at 700 lbs. But the most extraordinary of these bodies is one which was found buried in the soil near Rogues River, in Oregon, by John Evans, a gold seeker. Its weight is not given; probably it is still embedded in the earth; but it is said to surpass in size the famous mass of meteoric iron discovered by Pallas in Siberia, which weighed 1400 lbs. A fragment of the Oregon aërolite, sent to Boston, was found to contain 10½ per cent. of nickel combined with the iron.—*Times*, June 20th.

French Cosmetics.—At a recent sitting of the Academy of Medicine, Dr. Réveil read a paper on the necessity of preventing perfumers from selling poisonous or dangerous articles, which should be exclusively left to the responsibility of regular chemists, and not sold without a physician's prescription. "To show the danger there is in allowing the unchecked sale of certain compounds," he said, "I need but state that arsenic, the acid nitrate of mercury, tartar emetic, cantharides, colchicum, and potassa caustica form part of their ingredients. The kind of soap called lettuce soap, which is sold with the announcement that it has been acknowledged by the Academy, does not contain the slightest trace of lettuce. This and other soaps are all coloured green by the sesqui-oxide of chromium, or of a rose colour by the bi-sulphuret of mercury, known as vermilion. Some which are cheaper contain 30 per cent. of insoluble matter, such as lime or plaster of Paris, while others contain animal nitrogenous matter, which, having escaped the process of saponification, emits a bad smell when its solution is left exposed to the air. The various toilet vinegars are so far noxious, that, being applied to the skin still impregnated with soap and water, they give rise to a decomposition, in consequence of which the fatty acids of soaps, being insoluble in water, are not removed by washing, become rancid, and cause a chronic inflammation of the skin. The preparations employed for hair-dye under the pompous names of "African Water," "Florida Water," &c., all contain nitrate of silver, sulphur, oxide, and acetate of lead, sulphate of copper, and other noxious substances. All cosmetics for removing hairs or freckles are dangerous; the *lait antéphélique*, for instance, contains corrosive sublimate and oxide of lead. Were a chemist to deliver such a remedy to a customer without a regular prescription, he would be liable to a fine of 6000f." Dr. Réveil concluded by expressing his regret that certain physicians should so far forget their own dignity as to lend the support of their names to such noxious inventions.—*Galignani's Messenger.*

Chloroformic Solution of Gutta Percha.—

Take of Gutta Percha, in small slices, an ounce and a half.
Chloroform, twelve fluid-ounces.
Carbonate of Lead, in fine powder, two ounces.

To eight fluid-ounces of the chloroform contained in a bottle, add the gutta percha, and shake occasionally till it is dissolved; then add the carbonate of lead, previously mixed smoothly with the remainder of the chloroform, and having shaken the whole thoroughly together, several times at intervals of half an hour, set the mixture aside and let it stand for ten days, or until the insoluble matter has subsided, and the solution has become limpid, and either colourless or of a slight straw colour. Lastly, decant, and keep the solution in a glass stoppered bottle.—*American Journal of Pharmacy.*

Ether Employed in the Form of Affusion in Neuralgia.—From two drachms to an ounce and a half of ether are to be poured upon the most painful spot, and to be kept there by means of a small square of linen previously placed on and held in exact apposition to the skin, so that no wrinkling of the linen may allow of the escape of the fluid. In this way all the ether is brought into contact with the surface.

The ether should be poured upon the linen in small quantities, according to M. Betbeder, who originated this method of treatment. A brief pause should be made for the purpose of allowing it to evaporate, then some more of the fluid should be poured upon the linen compress, and this process should be continuously repeated. Similar applications should be made to the other points where the pain is most decidely manifested.

In recent cases of neuralgia, M. Betbeder says that he has always obtained a notable cessation of pain, often instantaneous, and frequently, also, definitive, without any subsequent relapse of the pain. In old standing cases of neuralgia the effect was much less marked, but even then the relief from the suffering was very satisfactory.—*Annuaire de Thérapeutique*, 1861.—*London Medical Review.*

Syrup of Santonine.—Santonine having become of late of such frequent employment as a vermifuge for children, M. Laforgue has contrived the following syrup for its more convenient administration :—Santonine, 4 parts ; simple syrup, 500 parts. Dissolve the santonine in a small quantity of alcohol, and add the solution to the boiling syrup.—*Gazette des Hôp.*, No. 53.

Syrup of Chloroform—May be prepared by the following formula:—10 parts by weight of chloroform are to be dissolved in 60 parts of oil of sweet almonds, 40 parts of gum added, and an emulsion formed with 350 parts of water. In this cold emulsion, placed in a close vessel, 540 parts of sugar are to be dissolved. It is a very stable syrup, rendering water white on admixture with it, and it contains exactly one hundredth of its weight of chloroform.—*L'Union Médicale*, No. 49.

Accidental Poisoning by Tincture of Colchicum.—An inquest was held on Friday, June 7th, at the Salutation, Princes Street, Stamford Street, by Mr. W. Carter, coroner for East Surrey, on the body of Christopher Kemish, aged 50, who died from the effects of an overdose of colchicum. Evidence was given by the widow of the deceased and other witnesses, to the effect that deceased had for a considerable time suffered from gout, for which he took small quantities of tincture of colchicum. He appeared well on Tuesday, June the 4th, but about one o'clock in the morning he felt some indications of an attack of gout, and got up for the purpose of taking the remedy. It appears that he always kept a supply of the colchicum at hand, and there were two bottles in the room, one containing a small portion of colchicum, and the other nearly full. It is supposed that he took up the latter and drank from the bottle, as he was in the habit of doing, what he considered to be his usual dose, but there appears to be no doubt that the bottle being full, he took more than he intended. He was shortly afterwards seized with violent purging, and about seven o'clock, having discovered that he had taken the wrong bottle, Dr. Johnson, of Waterloo Road, was sent for, who, on finding the length of time that had elapsed since the colchicum was swallowed, could only employ stimulants and other remedies with the hope of arresting the progress of the poison. These, however, failed, and the deceased gradually sank and expired in the course of the evening. The jury returned the following verdict :—"That the deceased had poisoned himself by misadventure."

Death from One Grain of Acetate of Morphia.—On the 31st of May, an inquest was held at the Bank of England Tavern, Cambridge Place, Paddington, on the body of George Cooper, aged forty-five. It appeared from the evidence that the deceased had been an out-patient at St. Mary's Hospital for pains in the face, caused by carious teeth. On the Wednesday week preceding, he had been ordered by Dr. Sieveking, whom he had visited at his own residence, to take a pill, which he obtained from the assistant dispenser at the hospital. This was the ordinary pill, kept ready made, containing one grain of acetate of morphia. He took it about twelve o'clock at night, and about three o'clock he complained, and expressed regret

at having taken it. He shortly afterwards fell asleep, and his wife could not succeed in waking him until eight o'clock, when he appeared very wild, and made a strange noise in his mouth. He was removed to the hospital, and notwithstanding the remedies used, he died about four o'clock P.M. A *post-mortem* examination was made by Mr. Rogers, who deposed that the urine was albuminous, and that the kidneys were in a highly diseased state, the morphia acting upon which had been the cause of death. No suspicion had been entertained that the deceased was suffering from diseased kidneys. The jury returned the following verdict:—"That death had been caused by misadventure, congestion of the brain having been produced by morphia taken as a medicine."

Accidental Poisoning by Laudanum.—On Sunday morning, June 16th, Mrs. Peel, the wife of the Dean of Worcester, took by mistake a large dose of laudanum, in place of some other medicine which, she supposed a bottle standing in her room to contain. She remained in a state of syncope for some time, but by the timely application of remedies the fatal effects were averted.

BOOKS RECEIVED.

A MANUAL OF BOTANY, *including the Structure, Functions, Classification, Properties, and Uses of Plants.* By ROBERT BENTLEY, F.L.S., M.R.C.S.E., &c. &c. Illustrated by nearly 1200 Woodcuts. London: John Churchill, New Burlington Street. 1861. 8vo, pp. 811.

The first part of this Manual having been already noticed in our pages (see vol. ii., second series, page 295), we have now only to point to its completion. It forms an admirable and very readable digest of Botanical Science; and from the full information which it gives of the medical and economic uses of plants, it is especially adapted to Pharmaceutical and Medical Students.

THE ERRORS OF HOMŒOPATHY. By Dr. BARR MEADOWS, Licentiate of the Royal College of Physicians, Edinburgh, &c. &c. London: HENRY RENSHAW, 336, Strand. 1861.

TO CORRESPONDENTS.

J. T. Z. (Dawlish).—*Sheep-dipping Composition* generally consists of arsenic combined with soft-soap and potash. For precautions to be observed in its use see vol. xviii. pp. 511 and 544.

A. P. S. (London).—The article sold under the name of "Nepenthe" is a preparation of opium. There is no published formula for its preparation.

W. H. (Wolverhampton).—*Silvering the interior of bottles.*—See vol. xviii., p. 584.

A. P. S. (Plymouth).—(1.) The leaves only of the plant are used, and they are gathered in the Spring. (2.) No. See vol. iii., p. 533, and vol. iv., p. 83. (3.) The whole of the water should be removed. (4.) We are unable to give the information. (5.) No.

G. H. W. (Bradford).—*Tinctura Arnicæ, Prus. Ph.*—Arnica flowers, ℥iss.; spirit of wine (at 0.900), ℔j.; digest and filter. A tincture is prepared from the root, and also from the leaves.

A. J T.—The crystals found in the specimen of extract of hyoscyamus are chloride of potassium, which crystals are frequently met with in the extract.

A. P. S. (Brighton).—*Tincture of Larch Bark* is prepared with proof spirit, one pint; larch bark, two ounces. See vol. xviii., p. 36.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, ELIAS BREMRIDGE, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. CHURCHILL, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

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OF

The Pharmaceutical Society of Great Britain.

1861.

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1851		Alexander, James Lyon	Sydney
1858	486	Avice, Charles Ernest	Mauritius
1848	34	Baeër, Gustave E.	Strasbourg
1855	401	Baissac, Pierre Joseph	Mauritius
1859		Baker, George S.	Geneva
1852	167	Baschet, George Constant	Mauritius
1858	505	Baschet, Pierre Edmond	Mauritius
1849		Baylis, William	Launceston, Tasmania
1852		Bishop, William	Wellington, N. Zealand
1858	506	Boullé, Janvier Alfred	Mauritius
1852		Carpenter, Henry	Demerara
1854	347	Dru, Casimir Theodore A.	Mauritius
1849	74	Fleurot, Emile	Mauritius
1855	389	Francis, Henry	Melbourne
1859	3	French, Joseph B.	Castlemaine, Australia
1853		Guiot, Jean Felix E.	Mauritius
1850	82	Lamusse, Louis A.	Mauritius
1847		Lediard, Charles	St. Vincent
1847	28	Mailloux, Joseph	Mauritius
1851	93	Mailloux, Auguste	Mauritius
1859	558	Mathew, John Alfred	Cape Town
1858	508	Minet, Alphonse Edouard	Mauritius
1847	19	Nobrega, Gerardo Jose da	Madeira
1855	407	Noël, Ferdinand	Mauritius
1860	526	Parker, Charles	Melbourne
1859	549	Perrot, Pierre Bénoni	Mauritius
1852	118	Regnaud, Charles	Mauritius
1860	588	Renaud, Desiré Monchéry	Mauritius
1850		Roberts, Henry	Florence
1852		Roberts, Thomas H.	Gibraltar
1843		Rogers, Henry	Bombay
1852	72	Sinimberghi, Nicholas	Rome
1858	467	Skinner, Henry	Kingston, Canada West
1844	1	Sparks, John	Bombay
1844		Stewart, F. H.	Demerara
1857	468	De Valancé, Charles P.	Mauritius
1859		White, Robert	California

The figures in the second column correspond with the number of the Certificate of Examination.

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1843		Allen, George	7, Cowper Street, City Road
1841		Allen, William	2, Morgan's Place, Islington
1844		*Ambrose, Thomas	94, Whitechapel Road
1853		Ambrose, John	1, Union Place, Commercial Road
1842		Anderson, Charles	23, Lower Belgrave Street
1857	241	Andrews, Frederick	23, Leinster Terrace, Upper Hyde Pk.
1842		Appleton, Thomas Cass	45, Curzon Street [Gardens
1841		Ashton, William	154, Sloane Street
1853		Attwood, Alfred	61, Cannon Street
1841		Austin, Henry	161, Bermondsey Street
1853		Bailey, Delamore J.	30, Conduit Street
1841		Baiss, William A.	102, Leadenhall Street
1841		Baiss, James	102, Leadenhall Street
1841		Baker, William J.	21, Brecknock Place, Camden Town
1861	537	*Baldock, John Henry	55, St. James's Road, Holloway
1845		Ball, Thomas M.	77, St. George's Road, Southwark
1841		Balmer, John	94, St. John Street Road
1841		Barber, Thomas A.	2, Scott's Place, Islington
1842		Barber, Joseph	7, Orange Street, Red Lion Square
1856		Barkley, William	18, Little Tower Street
1848		Barnard, John	1, Oxford Terrace, Clapham Road
1853		Barnes, James B.	1, Trevor Terrace, Knightsbridge
1853		Barron, Frederick	2, Bush Lane
1858	504	Barrs, John Adcock	55, Fore Street, City
1841		Barry, John T.	Plough Court, Lombard Street
1841		Bartlett, William	1, Brettin Place, Chelsea
1844		Bastick, William	2, Brook Street
1841		Bayley, Edmund	17, St. Mary's Terrace, Walworth Rd.
1851		Beaton, John	174, Shoreditch
1853		Becket, William E.	6, Giltspur Street
1853	17	*Bell, William Henderson	48, Albany Street, Regent's Park
1842		Bentley, William	11, Mount Street, Bethnal Green
1841		Best, John D.	26, Suffolk Street, Pall Mall
1841		Bigg, Thomas	Great Dover Street
1842		Binge, Thomas	23, Stockbridge Terrace, Pimlico
1841		Bird, William L.	42, Castle Street East
1850	57	Bird, Augustus	22, High Street, Kensington
1859	322	Bishop, Alfred	Mile End New Town
1843		Blake, Charles T.	47, Piccadilly
1842		Bland, John	57, Penton Street, Pentonville
1841		Blandford, John F.	9, Bruton Street
1853		Bolton, William	146, Holborn Bars
1842		Bond, Henry	11, Cross Street, Hoxton New Town
1853		Boothby, Henry Neal	72, Crawford Street
1842		Boully, Peter	Queen's Road, Bayswater
1849		Bourdas, Isaiah	10, Pont Street, Belgrave Square
1842		Bowden, Edward	13, Charles Street, St. James's
1852		Bower, William	96, Tottenham Court Road
1842		Bradley, John	21, Belgrave Road, Westminster
1847		Brewer, Eli	43, Duke Street, Manchester Square
1857	50	*Brewer, John W. N. T.	5, Liverpool Street, City

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Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
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1842		Brown, James	27, Aldgate
1842		Buck, Thomas	Kingsland Green
1842		Buckle, Christopher F.	3, North Place, Gray's Inn Road
1846		*Bucklee, William H.	86, New Bond Street
1845		*Burden, Edward	38, Duke Street, Grosvenor Square
1846		Burden, Thomas	6, Store Street, Bedford Square
1841		Burfield, Henry	180, Strand
1853		Burgoyne, James	31, Throgmorton Street
1857	333	*Butt, Edward Northway	235, Oxford Street
1855		Carr, John	171, High Holborn
1853		Carrick, James	46, Churton Street, Belgrave Road
1853		Carty, John	172, New Bond Street
1853		Cattell, George	Camberwell New Road
1853		Chard, Frederick J.	13, Eccleston Street South
1853		Chubb, James C.	59, St. John Street, Clerkenwell
1845		Clarke, Benjamin	Mare Street, Hackney
1856	181	Clarkson, James	109, Upper Street, Islington
1853		*Cockrill, James	2, Wellington Street, Waterloo Town
1849		Cocksedge, Henry B	20, Bucklersbury
1852		Colchester, William M.	2, Crown Street, Hoxton
1842		Coles, John	New Road, Camberwell
1854	191	Coles, Charles	72, Euston Square
1845		Collins, John R.	Haverstock Hill
1853		Collins, Robert N.	Oxford Court, Cannon Street
1841		Compton, Charles	14, Brewer Street, Golden Square
1841		Constance, William	5, Hanover Place, Regent's Park
1848		Constance, Edward	37, Leadenhall Street
1853		Cooke, John	171, Hoxton Old Town
1848		Cooper, William T.	26, Oxford Street
1853		Cooper, Robert H.	20, Royal Exchange
1847		Corfield, Daniel	22, Thrawl Street, Spitalfields
1853		Cornelius, Joseph	Clapham
1848		Cowdery, George T.	36, Paternoster Row
1845		Cracknell, Charles	107, Edgware Road
1859		Crispe, James	4, Cheapside
1858		Crocker, Edwin	19, Richmond Road, Islington
1853		Cross, Henry	4, Shepperton St., New North Rd.
1841		Croucher, John T.	223, High Street, Shadwell
1853		Croyden, Charles	37, Wigmore Street
1852		Curtis, Frederick	48, Baker Street
1853		*Darby, Stephen	140, Leadenhall Street
1842		Davenport, John T.	33, Great Russell Street, Bloomsbury
1841		Davies, Charles	11, Claremont Place, North Brixton
1845		Davies, Henry E.	43, Wood Street, City
1860	377	Davies, William G.	28, Sidney Place, Commercial Road
1841		*Davy, Charles	100, Upper Thames Street
1841		Deane, Henry	Clapham
1850		Dickinson, William	16, Cambridge Street, Edgware Road
1842		Doughty, Ed. Davidson	4, William Street, Knightsbridge
1841		Down, John	1, Queen's Road, Bayswater
1841		Drew, James	2, Bush Lane, Cannon Street
1859	352	Dyson, William B.	4, Gloucester Rd., South Kensington
1845		Eade, George	39, Goswell Road
1847		Eardley, John	14, Charles St., Westbourne Terrace

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1841		Eddy, Charles W.	30, Crown Street, Finsbury
1853		Edwards, William S.	14, Eltham Place, Old Kent Road
1853		Elam, Benjamin	196, Oxford Street
1853		Elkington, Edward	56, Grange Road, Bermondsey
1849		Ellis, George H.	4, Pavement, Finsbury
1856	258	*Elsey, Charles	107, Edgware Road
1853		Elvey, Thomas	8, Halkin Street, West
1841		Evans, John	60, Bartholomew Close
1851		Evans, John H.	60, Bartholomew Close
1841		Faulconer, Robert H.	Keen's Row, Walworth
1853		Fells, John	Stockwell
1853		Fenn, John T.	83, Regent Street, Westminster
1841		Field, William	27, Queen's Buildings, Brompton
1856	88	*Field, James John	5A, Holloway Place, Holloway
1842		Fincham, Robert	57, Baker Street
1858	445	Ford, Charles	Bayswater
1858	160	Forrest, Richard	9, Celbridge Place, Westbourne Park
1842		Foulger, Samuel	133, St. George's Street, East
1841		Fowler, Richard	14, Brewer Street, Golden Square
1841		Fox, William	48, Church Street, Bethnal Green
1856		Francis, George B.	11, Old Fish Street, City
1857		Francis, George	23, Charlwood Street, Belgravia
1841		Freeman, John	13, Blackfriars Road
1853		Freeman, Richard	5, Clayton Place, Kennington Road
1843		*Freeman, Robert	38, High Street, Kensington
1853		Gadd, Charles	1, New Bridge Street, Vauxhall
1842		Gale, Henry	3, Millbrook Place, Camden Town
1854	78	Gale, Samuel	338, Oxford Street
1841		Galliers, George	230, Tottenham Court Road
1841		Garden, Alexander	372, Oxford Street
1843		Garden, Felix R.	372, Oxford Street
1841		*Garle, John	Kilburn
1858		Gedge, William Stedman	77, St. John Street
1850		*Gerard, Philip Augustus	390, Strand
1848		Gigner, John	King's Road, Chelsea
1843		Gill, George W.	15, Crown Place, Walworth
1842		Glover, George	19, Goodge Street
1841		*Gloyne, Charles	5, Terrace, Kensington
1842		Goddard, John D.	6, Arthur Street, City
1853		Golding, William	42, Upper Albany Street
1842		Goodbarne, Thomas	13, Charles Place, Charles Square
1842		Goodbarne, Thomas R.	Hornsey Road
1853		Goode, Thomas	47, Minories
1847		Goodger, David	31, Regent Street
1853		Goosey, William	5, Ocean Row, Stepney
1853		Gorton, John G.	144, High Street, Whitechapel
1854		*Gosden, Henry	140, Leadenhall Street
1856		Gould, John	Chicksand Street
1853		Gould, John Granger	198, Oxford Street
1853		Green, Josiah James	Park House, St. John's Wood
1847		Greenish, Thomas	20, New Street, Dorset Square.
1842		Griffiths, John	Clerkenwell Green
1853		Grisdale, John M.	216, Tottenham Court Road
1853		Gristock, Thomas	42, South Street, Manchester Square
1851		Gulliver, William	33, Lower Belgrave Street

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
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1853		Hackman, Leonard L.	41, Union Street, Bishopsgate Street
1853	182	Hains, Parton John	Highgate
1857		Hall, Robert	18, Wigmore Street
1841		Hanbury, Cornelius	Plough Court, Lombard Street
1841		*Hanbury, Daniel Bell	Plough Court, Lombard Street
1857		*Hanbury, Daniel	Plough Court, Lombard Street
1853		Harris, Daniel R.	55, St. James's Street
1852		Harvey, Edward	6, Giltspur Street
1855		Haselden, Adolphus F.	18, Conduit Street
1843		Hemingway, Walter	20, Portman Street
1842		Henly, John C.	213, Upper Thames Street
1853		Henty, Henry M.	87, High Street, St. John's Wood
1841		Herring, Thomas	40, Aldersgate Street
1841		Herring, William	40, Aldersgate Street
1841		Herring, Edward	Lombard Road, Battersea
1843		Hewitt, John	1, Wellclose Street, Wellclose Square
1842		Hewlett, Charles J.	Cree Church Lane
1852		Hickley, Thomas P.	125, Edgware Road
1842		Hill, Arthur S.	11, Little Britain
1853		Hill, Arthur B.	11, Little Britain
1853		Hillgenberg, Henry	38, Houndsditch
1848		Hills, Thomas H.	338, Oxford Street
1852		Hockin, John B.	38, Duke Street, Manchester Square
1848		Hodgkinson, Henry	3, Newland Terrace, Kensington
1852		Hogg, Robert	9, Albion Place, Hyde Park Square
1841		Hooper, William	24, Great Russell St., Covent Garden
1842		Hooper, William	7, Pall Mall East
1841		Hooper, Bartlett	43, King William Street, City
1841		Hooper, Hugh H.	22, Commerce Place, Brixton
1853		Hopkin, William K.	5, New Cavendish Street
1849		Hopkins, Thomas	34, Montague Square
1851		Hopkins, Thomas B.	Tulse Hill, Brixton
1853		Hora, Henry W.	58, Minories
1853	175	Horncastle, John	12, Stanhope Terrace
1841		Horner, Edward	20, Bucklersbury
1841		Horner, James T.	20, Bucklersbury
1859		Howden, Robert	78, Gracechurch Street
1856	412	Howell, Maurice	Peckham
1856	435	Howell, Thomas	81, High Street, Camden Town
1842		Hucklebridge, James M.	103, Upper Ebury Street
1841		Hudson, William B.	27, Haymarket
1843		Hughes, William P.	171, Hoxton Old Town
1853		Hugill, John	61, Cannon Street
1842		Humpage, Benjamin	44, Chancery Lane
1853	198	Hunt, William	Camberwell Green
1842		Huskisson, John	12, Swinton Street
1841		*Huskisson, William	12, Swinton Street
1853		Huskisson, Henry O.	77, Swinton Street
1848		Huxtable, John	104, St. John Street Road
1848		Huxtable, William	104, St. John Street Road
1853		Ingram, Robert	2, Queen's Terrace, St. John's Wood
1841		Jackson, John	47, Southampton Row
1855	298	Jefferson, Ebenezer W.	6, Finsbury Place South

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1845		Jeynes, George W.	42, Princess Street, Edgware Road
1853		Jobson, Thomas C.	4, John's Row, St. Luke's
1861	592	Johnson, Benjamin M.	70, Tottenham Court Road
1853		Jolley, George	13, Curzon Street, Mayfair
1842		Jones, Peter	11, Norton Folgate
1849		Jones, Henry S.	Fulham Road
1849		Jones, William John	1, Whittington Ter., Upper Holloway
1841		Keating, Thomas	79, St. Paul's Churchyard
1842		Kemp, Robert	2, Queen's Place, Holloway
1842		Kemp, Richard	Upper Street, Islington
1859	325	Kendall, Charles Fisher	14, Old Dorset Place, Clapham Road
1841		Kent, Thomas	226, Blackfriars Road
1848		*Kernot, George	2, Chrisp Street, Poplar
1852	81	Kershaw, George	113, Park Street, Camden Town
1853		Kettle, Joseph	42, Castle Street East
1853		King, Charles T.	86, Snow Hill
1855	309	Kingdon, William Y.	6, Devonshire Terrace, Notting Hill
1853		Lacy, Benjamin W.	13, Westbourne Grove
1842		*Langton, Frederick C. R.	226, Upper Thames Street
1850		Large, John H.	2, Holt's Place, New North Road
1853		Laugher, Charles H.	Camden Town
1853		Lavers, Richard H.	28, Old Street Road
1856		Lawrence, Frederick	8, New Chapel Street, Kentish Town
1857	429	Lawrence, Henry	49, High Street, Kensington
1841		Lescher, Joseph S.	60, Bartholomew Close
1842		Lessey, John	97, High Street, Marylebone
1853		Lidwell, Joshua E.	46, High Street, Notting Hill
1861	388	*Lomas, Joseph W.	5, Henry's Place, Old Kent Road
1853	260	Long, George	114, High Holborn
1861	586	Long, Henry	48, High Street, Notting Hill
1853		Lowe, William E.	8, Stafford Street, Bond Street
1841		*Luckombe, Charles	86, Snow Hill
1841		*Macmurdo, Edward	100, Upper Thames Street
1842		McCulloch, William	5, Coleman Street
1849		McCulloch, Charles	Covent Garden.
1853		McDougall, William	8, Union Terrace, Notting Hill
1849		Maitland, Alexander	8, Torrington Place, Torrington Sq.
1841		Maitland, John	10, Chester Place, Hyde Park
1853		Mansell, William	Plough Court, Lombard Street
1853		Marris, Joseph	37, Berners Street
1853		Marshall Thomas	2, Clayland's Place, Clapham Road
1853		Mason, John W.	45, Upper Marylebone Street
1853		Matland, George	10, Nassau Place, Commercial Road
1842		May, John	Battersea
1857		*Medlock, Henry	20, Great Marlborough Street
1842		Meggeson, George	Wandsworth
1853		Merrell, James	1, Queen's Terrace, Camden Villas
1857	485	*Michell, Frederic	3, Rye Lane, Peckham
1855		Mitchell, John	254, Upper Street, Islington
1842		Moody, James	24, Church Street, Camberwell
1846		Moore, James L.	1, Craven Street, Westbourne Terrace
1841		*Mordaunt, John	Liverpool Road
1853		Morson, Thomas	19, Southampton Row
1841		*Morson, Thomas N. R.	38, Queen Square, Bloomsbury
1841		*Moscrop, Edward H.	140, Strand

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1855		Mould, Samuel	21, Moorgate Street
1859	217	Mousell, Thomas	5, Frith Street, Soho
1855	218	Mumford, George	5, Bathurst Street, Hyde Park
1860	519	Nicholson, Frederick	St. Paul's Road, Highbury
1853		Northway, John	27, Great Tower Street
1855		Oldfield, Henry	94, Smithfield Bars
1841		Orridge, Benjamin B.	30, Bucklersbury
1841		Orridge, William	22, Ludgate Hill
1853		Palmer, Robert	33, Wilton Place, Belgrave Square
1853		*Parnell, George William	11, Victoria Road, Pimlico
1842		Pasmore, James	5, Colville Terrace, Chelsea
1853		Pattison, George	126, St. John Street Road
1853		Peacock, Hamerton R.	170, High Street, Poplar
1841		Pedler, George S.	199, Fleet Street
1852		*Penrose, Arthur Wellesley	7, Amwell Street, Clerkenwell
1853		Pepper, John	1, Bedford Street, Bedford Square
1843		Peppin, Sydenham H.	25, Princes Street, Leicester Square
1859	538	Pettifer, Edmund Henry	6, Southgate Road
1854		Phillips, John	3, Vernon Place, Bagnigge Wells Rd.
1842		Philpot, Henry	32, Praed Street, Paddington
1858	431	*Pidduck, John	Harrow Road
1843		Plummer, George	High Street, Peckham
1841		Pollock, Thomas	129, Fenchurch Street
1842		Potts, Robert U.	26, South Audley Street
1853		Power, John Henry	Denmark Hill
1846		Pratt, Edmund	27, Bishopgate Within
1842		Preston, Joseph T.	94, Smithfield Bars
1855	68	Quiller, Charles R.	15, Sloane Square
1859	397	Radermacher, Charles J.	2, New Cavendish Street
1841		Rea, Edward	115, Wardour Street
1853		Readman, Henry	18, Mortimer Street, Cavendish Sq.
1841		Redwood, Theophilus	19, Montague Street, Russell Square
1856		Reynolds, James John	3, Hanover Street
1854		Richards, James	40, New Bridge Street, Blackfriars
1845		Richardson, George	12, Norland Place, Notting Hill
1848		Ridsdale, James	1, Wakefield Terrace, Caledonian Rd.
1843		Roach, Pope	8, St. James's Street
1860	393	*Robbins, John	372, Oxford Street
1841		Rouse, Benjamin R. C.	9, Wellington Street, Southwark
1842		Rouse, Frederick J.	Clapham
1841		Rouse, Robert	1, Wigmore Strect
1857	328	Rowntree, Thomas	1, Arundel Place, Islington
1859	415	Rowson, Henry	18, Chichester Street
1848		Sadler, William C.	13, Norton Folgate
1841		Sainsbury, Samuel	177, Strand
1843		Sandford, George W.	47, Piccadilly
1853		Schacht, William	38, Houndsditch
1843		*Sharpe, George Young	6, Kensington Terrace
1842		Sharwood, James Allan	98, Fenchurch Street
1841		*Shirley, John George	1, Westbourne Grove, Bayswater
1852		Simmons, Joseph	38, Lambeth Walk
1851	89	Sims, John F.	8, Hemingford Place, Barnsbury
1854		Skidmore, John	3, Charles St. West, Westbourne Ter.
1842		Slipper, James	86, Leather Lane

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1847		Smith, William F.	12, Keen's Row, Walworth
1854		Snell, Glanville A.	3, Hampton Terrace, Hampstead Rd.
1842		Snelling, Francis	23, Farringdon Street
1843		Solly, Stephen F.	St. George's Circus, Southwark
1841		*Squire, Peter	277, Oxford Street
1841		Squire, William	5, Coleman Street
1841		Starkie, James	4, Strand
1858	147	Stathers, John	43, Norland Road, Notting Hill
1849		Stead, John M.	213, Upper Thames Street
1842		Steer, Philip R.	Church Street, Hackney
1854	97	Stocken, James	112, Drummond Street, Euston Sq.
1850		Stuart, John E.	172, New Bond Street
1853		Summers, James R.	43, Curtain Road
1841		Swire, Roger	14, Edgware Road
1854		Swire, George	Brixton Hill
1853		Symons, William	17, St. Mark's Crescent, Regent's Pk.
1854		Taylor, John	77, Hackney Road
1853		Thomas, Henry	7, Upper St. Martin's Lane
1851		Thomas, Richard W.	10, Pall Mall
1855		Thomas, John Jabez	Stoke Newington
1845		Thompson, Henry A.	86, Chiswell Street
1857	372	Tibbs, Frederick	47, Blackfriars Road
1841		Tippett, Benjamin M.	3, Sloane Street
1841		Tonge, George	213, Upper Thames Street
1842		Towerzey, Alfred	20, Marylebone Street
1857	61	Trask, Thomas	14, Albany Street
1853		Tupholme, John T.	38, Lamb's Conduit Street
1859	222	Turner, Charles E.	63, Great Russell Street, Bloomsbury
1853		Turner, Richard	2, Oxendon Street, Haymarket
1853		Tustin, Thomas H.	London Hospital
1842		Twinberrow, William	2, Edward Street, Portman Square
1852	90	Urwick, William W.	60, St. George's Road, Pimlico
1853		Vint, James	3, High Street, Bow
1857	357	*Vizer, Edwin B.	63, Lupus Street, Pimlico
1841		*Wagstaff, John Henry	James Street, Westbourne Terrace
1842		Walker, Alexander	10, Ireland Row, Mile End
1842		*Walker, Henry	35, Skinner Street, Somers Town
1845		Ward, Francis	14, Grosvenor Street
1846		*Warner, Charles Heath	55, Fore Street
1844		Watts, William	3, Gray's Place, Brompton
1853		Watts, William M.	32, Whitecross Street
1853		Watts, Peter	6, Sol's Row, Hampstead Road
1856	110	Watts, Henry T.	11, Victoria Road, Pimlico
1841		Waugh, George	177, Regent Street
1853		Wegg, William	10, North Place, Ball's Pond
1842		Westwood, William H.	16, Newgate Street
1842		Westwood, Robert	16, Newgate Street
1854	321	Wheeler, Christopher	56, Hackney Road
1853		*Whitburn Augustus R.	174, Regent Street
1841		White, John	228, Piccadilly
1841		White, Daniel	19, Park Terrace, Regent's Park
1852		White, Edmund	19, Park Terrace, Regent's Park
1842		Wilkes, George	1, Hayfield Place, Mile End

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1853		Wilkinson, William	114, Lambeth Walk
1851		Williams, John	5, New Cavendish Street
1857	363	Williams, Thomas	2, Hereford Terrace, Bayswater
1844		Willmott, William	83, High Street, Southwark
1857		Willows, John	101, High Holborn
1853		Wilson, Thomas	Upper Holloway
1853		Windle, William	48, Portman Place
1842		Wooldridge, John	19, Bath Place, New Road
1855	364	*Wrangham, John	3, Acre Lane, Brixton
1859		Wright, George Henry	7, Poultry
1853		Wright, William V.	11, Old Fish Street
1842		Wyman, John	122, Fore Street
1858	294	*Yarde, Giles	28, Lamb's Conduit Street
1842		Yates, Benjamin	25, Budge Row, Cannon Street
1859	443	*Yates, Francis	100, Upper Thames Street
1852		Young, Frederick	137, Minories
1853		Young, George	12, Ebenezer Terrace, Mill Wall
1859		Young, William Herbert	35, Baker Street

COUNTRY MEMBERS.

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1846		Abbott, John Thomas	Darlington
1853		Abraham, John	Liverpool
1852		Ackerman, Theophilus	Bristol
1845		Ackrill, George	Abergavenny
1847		Acton, George	Worcester
1853		Adams, John	Loughborough
1853		Adams, Jonathan Henry	Stoke-on-Trent
1853		Adkins, Henry James	Birmingham
1849		Ainslie, William	Edinburgh
1852		Aitken, William	Edinburgh
1849		Albright, Henry	Liverpool
1853		Alderton, John	Hastings
1853		Aldridge, Alexander John	Brighton
1852		Alexander, James	Greenock
1861	620	*Allan, William	Dumfries
1848		Allanson, Charles	Harrogate
1847		Allen, Thompson	Boston
1853		Allen, Adam U.	Lymington
1859	555	*Allen, James Hore	Tottenham
1853		Alpass, Horace S.	Liverpool
1846		Althorp, James	Stamford
1858	400	Amos, Daniel	Canterbury
1852		Anderson, James	Musselburgh
1853		Anderson, Charles Thomas	Jersey
1853		Andrew, William	Aberdeen
1841		Andrews, John Betts	Clare
1853		Andrews, Thomas William Cox	Norwich
1854	375	*Anness, Samuel Richard	Ipswich
1841		Anthony, Jacob	Bedford
1853		Appleby, William H.	Stockport
1853		Archer, Thomas	Southam
1841		Argles, Henry	Maidstone
1858	268	Argles, John	Maidstone
1841		Armstrong, Henry	Preston
1853		Arnold, Adolphus	Guernsey
1841		Arnold, Edward	Norwich
1842		Arthy, Joseph	Peterborough
1853		Ash, James Freer	Wiveliscombe
1853		Ashton, John Swan	Leicester
1853		Ashton, William	Southport
1853		Aslin, John	Sunderland
1846		Asling, Brelsford	Spalding
1855		Astley, John	Coventry
1859	457	*Atherton, John Henry	Nottingham
1846		Atkins, Francis Thomas	Woolwich
1842		Atkins, Francis Thomas	Deptford
1853		Atkins, Samuel Ralph	Salisbury
1861	419	Atkins, Ernest	Deptford
1853		Atkinson, Richard Marshall	Leeds
1842		*Atkinson, Stephen	Doncaster
1855	420	*Atkinson, Matthew	Bowden Vale

Year of Member-ship.	No. of Certificate.	NAME.	RESIDENCE.
1842		Attwood, George	Brompton
1850		Aubin, James	Jersey
1853		Backhouse, William	Leeds
1844		Badcock, John	Barnard Castle
1852		Baildon, William	Edinburgh
1841		Baildon, Henry C.	Edinburgh
1853		Bailey, Richard	Penrith
1841		Bailey, William	Wolverhampton
1858	431	Bailey, Richard	Winchester
1845		Baines, Richard	Blackburn
1841		Baker, William	Chelmsford
1850		Baker, Charles Patrick	Chelmsford
1852		Baker, William	Twickenham Green
1842		Baker, William	Retford
1859	556	*Baker, Alfred Philip	Lewisham
1861		Baker, Garrad	Chelmsford
1855	391	*Balkwill, Frederick Pryor	Plymouth
1844		Ball, George Vincent	Banbury
1841		Ball, Joseph	Liverpool
1842		Ballard, William	Abingdon
1842		Ballard, Edwin	Farringdon
1850		Balls, George	Deptford
1845		Bally, Edward F.	Baldock
1841		Baly, Henry	Warwick
1859		Baly, James	Warwick
1848	12	Bancroft, John James	Ruthin
1859		Banfield, Harold	Bury St. Edmunds
1841		Banks, Morris	Birmingham
1859	484	*Banner, Samuel	Liverpool
1853		Barber, George	Liverpool
1845		Barclay, John	Falmouth
1853		Bard, William F.	Ixworth
1853		Barker, Joseph	Sudbury
1846		Barling, Thomas	Weymouth
1853		Barlow, Samuel	Darlington
1841		Barnes, James	Preston
1850		Barnett, William	Brighton
1853		Barnish, Edwin H.	Wigan
1853		Barritt, George	Croydon
1849		Barron, William	Cheltenham
1853		Barry, Edwin	Northampton
1853		Barry, James	Northampton
1853		Barstow, Charles H.	Spofforth
1847		Barton, Henry	Brighton
1853		Barton, Charles	Brighton
1852		Barton, William	Campbeltown
1842		Bass, William Thomas	Enfield
1846		Bassett, Charles	Pontypridd
1853		Batchelor, Charles	Fareham
1853		Bateman, John Bird	Manchester
1852		Bates, John	Bicester
1850		Bates, William I.	Macclesfield
1861	243	Bates, James	Wellington
1853		Bath, Richard C.	Morice Town

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Battle, John Richard	Lincoln
1841		Baumborough, William	Wandsworth
1855	207	Baxter, William Walmsley	Bromley
1841		Baynes, James	Hull
1858		Baylis, Thomas	Worcester
1861	402	Beach, James	Bridport
1847		Beadon, John	Taunton
1852		Beard, James	Manchester
1842		Beardsley, John	Nottingham
1853		Beaumont, William H.	Gravesend
1847		Beckett, John	Scarborough
1846		Beech, Joseph	Atherstone
1841		Beesley, Henry	Banbury
1844		Beesley, Thomas	Banbury
1851		Bell, William	Carlisle
1853		Bell, Edward C.	Dudley
1857	280	Bell, James	Manchester
1857		Bell, Francis	Bradford
1842		Bennett, George	Newark
1850		Bennett, John W.	Leigh, Lancashire
1853		Bentham, Thomas	Southsea
1853		Berry, Henry James	Worthing
1847		Berry, Edward	Gloucester
1853		Bettison, Joseph	Chesterfield
1853		Betts, John	Woodbridge
1847		Bevan, Charles F.	Harwich
1853		Bew, Robert	Bilston
1842		Biggs, Robert	Bath
1855	270	Biggs, Walter	Hampstead
1853		Binns, Samuel	Sheffield
1842		Birch, Thomas Edwards	Mold
1850		Bird, Ash Rudd	Ipswich
1842		Bird, Charles	Worcester
1842		Bird, Alfred	Birmingham
1841		Bishop, Robert	Eye
1849		Bishop, Thomas	Woolwich
1853		Black, James	Leven
1842		Blackburn, Bailey	Bradford
1852		Blacklock, Henry	Bournemouth
1841		Blacklock, Joseph D.	Brighton
1845		Blackshaw, Thomas	Burslem
1842		Blades, Christopher	Leek
1846		Blades, Holland	Nantwich
1842		Blades, Sherriff	Northwich
1856		Blake, William F.	Stroud
1853		Blamires, Samuel	Bradford
1857		Bland, John Handel	Stourbridge
1852		Blanshard, George	Edinburgh
1853		Blanshard, Thomas	Edinburgh
1848		Bloor, Joseph	Derby
1853		Blunt, Thomas	Shrewsbury
1842		Bolton, Thomas	Tenterden
1853		Bond, Laurence V.	Tiverton
1842		Bond, John	Great Yarmouth

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1850		Bond, Charles	Kidderminster
1842		Bond, John	Minehead
1848		Boocock, John	Leeds
1852	116	Boorne, Charles	Bristol
1853		Booth, James	Blackburn
1853		Booth, Thomas Buckley	Eccles
1842		Booth, John	Heckmondwicke
1853		Booth, Aaron	Manchester
1841		Booth, James	Rochdale
1858	499	*Booth, Henry	Rochdale
1853		Booth, Nathaniel	Rotherham
1859	332	Borland, John	Kilmarnock
1853		Bostock, William	Ashton-under-Lyne
1855	304	Botham, William	Sheffield
1842		Bottle, Alexander	Dover
1849		Bowen, Henry F.	Brighton
1841		Bowerbank, Joseph	Cockermouth
1853		Bowerbank, Fawcett	Cockermouth
1843		Bowers, Thomas	Chester
1847		Bowers, James D.	Chester
1853		Bowker, James	Manchester
1853		Bowles, Charles A.	Chester
1858	29	Bowman, William	York
1853	257	*Boyce, John Pierce	Windsor
1841		Boyce, John Pierce	Chertsey
1842		Braddock, William	Oldham
1856	411	*Brady, Henry B.	Newcastle-on-Tyne
1853		Bragg, William B.	Market Harborough
1842		Brailey, Charles	Heavitree
1849		Bramwell, George	Liverpool
1853		Brandreth, Lawrence	Preston
1842		Brayshay, William Bolam	Stockton
1842		Brearey, William A.	Douglas
1846		Bremner, William	Thurso
1845		Brend, Thomas	Swansea
1852		Brereton, John	Manchester
1858	272	Breton, Walter	Brighton
1858	428	*Brevitt, William Y.	Wolverhampton
1842		Brew, Thomas Archer	Brighton
1842		Brewster, William	Cambridge
1853		Brierley Richard	Stalybridge
1842		Briggs, James	Tipton
1843		Bright, Philip	Brecon
1853		Bright, William	Bath
1842		Brocklehurst, James	Hyde
1853		Bromfield, William	Crewe
1853		Bromfield, Charles	Exeter
1848		Bromley, Charles	Liverpool
1842		Brown, Charles	Belper
1853		Brown, Thomas Dudley	Coventry
1846		Brown, William	Dunfermline
1844		Brown, John	Eccles
1852	121	Brown, David R.	Edinburgh
1853		Brown, Thomson	Glasgow
1853		Brown, Alfred James	Halstead

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1850		Brown, Thomas	Lutterworth
1845		Brown, William Scott	Manchester
1853		Brown, George	Selby
1853		Brown, Samuel	Coningsby
1847		Bryant, William	Huntingdon
1853	226	Bryce, James	Dunfermline
1853		Buck, Richard C.	Dudley
1853		Bullus, William	West Bromwich
1853		Bunn, Charles	Colchester
1842		Burdon, John	Durham
1848		Burdwood, James	Plymouth
1851		Burgess, William	Northwich
1853		Burnett, Robert	Frazerburgh
1853		Burrell, George	Montrose
1852		Burrow, Walter B.	Great Malvern
1853		Burrow, John Severn	Great Malvern
1860	598	*Burton, John	Nottingham
1853		Bustin, William	Shotley Bridge
1852		Butcher, Thomas	Cheltenham
1841		Butler, Samuel	Bristol
1841		Butler, William	Wycombe
1853		Butler, Thomas E.	Leicester
1841		Butterfield, James M.	York
1853		Butterworth, Isaac	Ashton-under-Lyne
1853		Caddick, John	Newcastle-under-Lyne
1853		Caley, Albert Jarman	Norwich
1849		Calvert, Robert	Stokesley
1842		Calvert, James	Belper
1861	444	Calvert, John	Leeds
1846		Campbell, Donald	Glasgow
1852	122	Carmichael, Lauchlan	Edinburgh
1842		Carr, William	Leicester
1841		Carr, William Graham	Berwick
1844		*Carran, Thomas	Peel, Isle of Man
1853		Carruthers, Richard Birrell	Dumfries
1850		Carter, William	Manchester
1844		Cartwright, William	Newcastle-under-Lyne
1852		Cattle, James	Liverpool
1853		Chamberlin, William	Downton
1842		Chantry, George	Goole
1855	62	Chaplin, John Lambert	Colchester
1846		Chaplin, Alfred	Brighton
1849		Chapman, Richard J.	Chipping Ongar
1853		Chapman, Henry	Clifton
1841		Chapman, John Cook	Congleton
1842		Chapman, Edward	Hull
1853		Chapman, William Fox	Hull
1853		Chapman, William	Ipswich
1853		Chapman, Henry	Ipswich
1853		Chapman, John	Tring
1851		Chaston, Robert	Lowestoft
1841		Chater, Jonathan	Watford
1853		Chaundy, Thomas G.	Oxford
1842		Chave, John Anstey	Uxbridge
1849		Cheshire, John	Grantham
1853		Childs, James L.	Southsea

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		*Chipperfield, Robert	Southampton
1859	487	*Chrispin, William	Ripon
1851		Christian, Francis	Birmingham
1842		Christopher, William	Crickhowell
1853		Churchill, John	Birmingham
1856		Churchouse, William B.	Chard
1855	334	Clark, William W.	Dorking
1853		Clark, Robert	Devizes
1845		Clark, John Webster	Leicester
1853		Clarke, Benjamin Joseph	Cheltenham
1853		Clarke, William	Longsight
1846		Clarke, Thomas Meadows	Richmond
1841		Clarke, Joseph	York
1860	200	Clarke, William R.	Northampton
1853		Clater, Francis	Retford
1841		Clay, Robert	Liverpool
1854	201	Clayton, John Oates	Leeds
1853		Clennell, John Morton	Newcastle-on-Tyne
1853		Clift, Joseph	Dorking
1849		Clift, Edward	Lewisham
1845		*Coates, William	Leeds
1858		Coates, John M.	Newcastle
1852		Cochrane, Thomas	Falkirk
1853		Cock, John	Shipdham
1842		Cocking, George	Ludlow
1853		Cockton, John	Maryport
1841		Colbeck, George Royde	Leamington
1848		Cole, Walter Thomas	Weymouth
1859		Collier, William Lindsey	Reading
1853		Collier, William	Sheffield
1849		Collings, William Henry	Bristol
1852		Colton, Thomas	Selby
1853		Commans, Robert Dyer	Bath
1853	185	Conacher, David	Markinch
1853		Constable, Edwin	Birkenhead
1842		Conway, William	Pontypool
1847		Cooling, John	Newark
1843		Cooke, William	Norwich
1845		Cooper, Mark Ward	Bridlington
1850		Cooper, George Brown	Brightlingsea
1852		Cooper, James Robert	Birmingham
1841		Cooper, James Newbury	Clifton
1841		Cooper, George	Exeter
1841		Cooper, Thomas	Leicester
1853		Cooper, Lewis	Reading
1845		Cooper, Thomas	York
1853		Corfield, Thomas J. T.	St. Day
1843		Cornelius, Richard Bussell	Teignmouth
1859	469	*Cornell, William	Stowmarket
1845		Cornish, Henry Robert	Penzance
1843		Cornish, William	Brighton
1841		Corrie, Charles	Bedford
1841		Cortis, Charles	Worthing
1853		Cottee, William	Salford
1853		Cotterell, William Henry	Dover

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1841		Cotton, Gilbert Knill	Barnstaple
1853		Coupland, Henry	Liverpool
1853		Coupland, Joseph	Harrogate
1842		Cousins, Thomas George	Oxford
1841		Cousins, John Rose	Dorking
1842		Coverley, John	Scarborough
1845		Cowell, Silas	Canterbury
1845		Cowgill, Brian	Burnley
1861		Cowl, William	Manchester
1841		Crafton, Ralph Caldwell	Croydon
1853		Crarer, John	Blairgourie
1853		Crick, George Edward	Maldon
1853		Cripps, John	Hammersmith
1842		Critchley, John	Blackburn
1842		Crocker, Henry Radcliffe	Brighton
1853		Crofts, Holmes Cheney	Chatham
1852	124	Croley, William	Edinburgh
1842		Cronshey, James	Thetford
1841		Crook, George	Farnham
1841		Cropper, James	Long Sutton
1853		Croskell, Charles	York
1858	432	*Cross, William	Cardiff
1847		Cross, William Gower	Shrewsbury
1861	567	*Crowe, Thomas Lea	Hereford
1846		Crowther, Thomas	Tickhill
1851		Cuff, Robert C.	Bristol
1852		Cumbers, John	Wandsworth
1853		Cumine, Frederick H.	Southport
1841		Cupiss, Francis	Diss
1853		Currie, John	Glasgow
1854	273	Cuthbert, John Mason	Bedford
1842		Cutting, James Bray	Leamington
1848		Cutting, Thomas	Selby
1853		Cutts, Thomas	Basford
1842		Dale, George	Chichester
1844		Dale, William James	Portsea
1855		Dance, William D.	Stourport
1853		Dandie, David	Perth
1855	126	Dandie, Robert	Perth
1850		Davenport, Edward	St. Alban's
1846		Davidson, John	Berwick
1853		Davidson, Charles	Aberdeen
1842		Davies, Richard Morgan	Carmarthen
1853		Davies, John L.	Hay
1853		Davies, Peter Hughes	March
1853		Davies, William Henry	Newport, Mon.
1841		Davis, John	Dorchester
1841		Davis, Robert	Dorchester
1859	282	Davis, Richard Hayton	Harrogate
1856		Davis, D. Frederick	Leominster
1841		Davis, Henry	Leamington
1842		Davis, Francis	Newbury
1848		Davis, John Oliver	St. Leonards
1845		Davison, Ralph	York

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1854		Dawe, Sampson	Monmouth
1853		Dawson, Thomas	Preston
1853		Day, George	Blackheath
1853		De Bois, Frederick	Glasgow
1853	194	Deck, Arthur	Cambridge
1845		Dennison, Matthew	Dudley
1853		Densham, John B.	Plymouth
1860	523	*Deighton, Thomas Milner	Bridgnorth
1852		Dewar, Peter James	Dingwall
1842		Dexter, James	Eastbourne
1842		Dickerson, Henry	Devonport
1845		Dickins, Rowland	Aylesbury
1847		Dingley, Richard Loxley	Evesham
1853		Dixon, Benjamin	Norwich
1858	460	*Dixon, Henry	Ryde, Isle of Wight
1854	381	*Dixon, William	Southampton
1842		Dobinson, William	Sunderland
1853		Dobson, James	Keswick
1858		Dobson, John	Newcastle-on-Tyne
1847		Dodman, Robert	Thorney
1842		Dodshon, Edward...	Sunderland
1852		Done, John	Manchester
1846		Doubell, James	Rayleigh
1855		Doughty, Richard	Bushey
1842		Dowell, William Cuming	Bristol
1845		Dowman, George	Southampton
1847		Down, Richard Haydon	Torpoint
1853		Downes, Joseph	Lower Mitcham
1847		Downing, Joseph	Braintree
1852		Dowthwaite, William	Towcester
1841		Drage, William F.	Birmingham
1841		Dresser, Richard	York
1841		Duck, Daniel	Guisborough
1846		Dudden, Richard M.	Midsomer Norton
1852		*Dudgeon, George	Nottingham
1842		Duggan, Henry Stephen	Hereford
1853	184	Duncan, William	Rothesay
1841		Duncan, John	Edinburgh
1842		Duncan, Frederick McRae	Sandwich
1842		Dunhill, William	Doncaster
1861	539	*Dunhill, William Workman	Doncaster
1861	500	Dunn, James	Newcastle-on-Tyne
1853		Duprey, Jean A. B.	Jersey
1853		Durant, Frederic	Dorking
1847		Dutton, John	Rock Ferry
1842		Dutton, George	Bolton
1853		Dyer, John	Margate
1853		Dyer, William	Halifax
1842		Dyson, John	Andover
1861	568	*Earle, Francis	Hull
1853		Eastes, Thomas Henley	Dover
1853		Edgar, James	Henley-on-Thames
1859	324	Edman, Bonner	Henley-on-Thames
1853		Edmonds, Benjamin M.	Lowestoft

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Edwards, George	Dartford
1853		Edwards, William	Denbigh
1850		Edwards, Henry	Lincoln
1848	22	*Edwards, John Baker	Liverpool
1853		Edwards, William	Sidmouth
1853		Ekins, William	Huntingdon
1842		Eliott, Samuel	Liskeard
1842		Ellaby, John	Melton Mowbray
1842		Ellis, Benjamin	Shepton Mallett
1853		Ellis, William	Abergele
1849		Ellis, Richard	Thornbury
1845		Elsey, John	Horncastle
1847		Ely, George	Bingham
1843		*England, William Paul	Huddersfield
1848		Ereaut, John	Jersey
1853		Ereaut, George	Jersey
1860	553	*Ereaut, John, Jun.	Jersey
1860	493	Essery, William	Plymouth
1858	211	Evans, Evan	Aberavon
1847		Evans, Thomas	Aberdare
1853		Evans, Samuel	Caerphilly
1842		Evans, John	Hemel Hempstead
1851	43	Evans, Thomas	Liverpool
1842		Evans, Edward	Liverpool
1854	47	Evans, Henry S.	Liverpool
1842		Evans, Thomas B.	Liverpool
1853		Evans, John	Narberth
1853		Evans, William Downing	Newport, Monmouth
1842		Eyre, Alfred B.	Ipswich
1842		Eyre, Thomas S.	Launceston
1844		Fairbank, James Hack	Woolwich
1853	361	Fairbarn, George	Liverpool
1853		Fairley, Thomas	Sunderland
1853		Falkner, Richard	Banbury
1853		Farie, Gilbert	Bridge of Allan
1842		Farmer, John	Putney
1853		Farnworth, William	Blackburn
1853		Farrage, Robert	Rothbury
1850		Farrant, Henry	Ottery St. Mary
1842		Farrant, Robert	Salisbury
1843		Farrant, John G.	Brentford
1854	99	Farrer, John Daniel	Chester
1853		Farrow, William	Woburn
1842		Fergusson, John	Liverpool
1842		Fielder, Thomas	Warminster
1842		Finch, John	Cheltenham
1852		Finlayson, Thomas	Leith
1851		Fisher, John Thornhill	Torquay
1853		*Fisher, Henry Christopher	Torquay
1853		Fiske, Charles	Ipswich
1843		Fitch, Robert	Norwich
1842		Fitt, Edward	Barking

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1841		Fleeming, William	Wolverhampton
1842		Fletcher, Francis	Cheltenham
1841		Flockhart, William	Edinburgh
1853		Flower, Thomas S.	Matlock-Bath
1842		Foggitt, Thomas Jackson	Thirsk
1841		Forbes, William	Reigate
1853		*Forge, Christopher	Bridlington
1853		Forman, George	Birmingham
1853		Forrest, Richard William	Gainsborough
1853		Forster, John	Whitehaven
1845		Forster, Robert	Dover
1853		Forsyth, William	Aberdeen
1841		Foster, Frederick	Brighton
1853		Foster, Alfred Hood	Birmingham
1845		Foster, James Fawcett	Hull
1842		Foster, Edward	Ludlow
1855		Foster, George Pitt	Tetbury
1853		Foster, John	Uckfield
1842		Foulds, William	Chowbent
1859	421	*Fouracre, Robert	Taunton
1853		Fowler, Edward	Bedale
1853		Fowler, Henry	Torrington
1849		Fox, Charles James	Witney
1853		Foxcroft, Elijah	Skipton
1853		Franks, Alfred	Ramsgate
1853		Fraser, Charles	Largs
1853		Frazer, Daniel	Glasgow
1853		Freeland, John	Barrhead
1844		Freestone, Thomas Morris	Bristol
1841		French, Gabriel	Chatham
1853		Fresson, Lewis Francis	Stevenage
1851		Frost, William Henry	Collumpton
1841		Fryer, Henry	Huddersfield
1849		Furmston, Samuel C.	Wycombe
1853		Gall, Benjamin D.	Woodbridge
1842		*Gamble, Richard	Grantham
1853		Gammidge, Samuel	Leicester
1841		Garbutt, Cornelius	Gateshead
1853		Garbutt, Cornelius D.	Gateshead
1842		Gardener, Charles	Tunbridge Wells
1841		Gardner, James	Edinburgh
1853		Garland, William	Leeds
1846		Garlick, Thomas H.	Halifax
1853		Garlick, John	Hollinwood
1853		Garnett, Joseph	Newcastle-on-Tyne
1851		Garnham, Barrington	Brighton
1842		Garratt, John Colpman	Rugby
1856		Garratt, Samuel	Rugby
1842		Garside, Burdett F.	Southport
1842		Gay, George	Stroud
1846		Geldard, John	St. Austell
1842		Geldard, Richard Kelly	Plymouth
1853		Gerrard, Joseph	Longton

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1841		Gibbons, William	Plymouth
1852		Gibbs, William	Ryde
1851		Gilbert, George	Portsea
1847	37	*Giles, Richard William	Clifton
1841		Giles, Richard Bobbet	Clifton
1842		Gill, Samuel	Pendleton
1842		Gill, William	Tavistock
1859	471	*Gill, Hugh	Halifax
1841		Gilkes, William	Leominster
1856	433	Gissing, Thomas W	Wakefield
1844		Glaisby, John	York
1841		Glaisyer, Thomas	Brighton
1852	71	Glanfield, George	Torquay
1859	458	*Glass, John T.	Cheltenham
1853		Glew, William	Selby
1850		Glover, Samuel	Liverpool
1841		Gloyne, Thomas Hadfield	Dewsbury
1858		Glyde, John William	Blandford
1848		Goadsby, Thomas	Manchester
1842		Goddard, Joseph	Leicester
1845		Goddard, Henry Edward	Yarmouth
1842		Goodall, Thomas	Eynsham
1850		Goodall, Henry	Derby
1841		Goode, Thomas	Congleton
1857	79	Goode, Charles	Congleton
1857		*Goodwin, John	Lower Clapton
1842		Gordelier, Paul William Gibbs	Sittingbourne
1853		Goss, Samuel	Barnstaple
1853		Gostling, Thomas P	Diss
1853		Gould, Frederick	Kingston-on-Thames
1855		Govan, Alexander	St. Andrews
1841		Gow, Alexander	Wolverhampton
1857		Granger, Edwin John	Upper Clapton
1852	130	Gray, Alexander F.	Edinburgh
1852	131	Gray, John	Cupar Angus
1848		Gray, William	Rothwell
1853		Gray, Charles	Bilston
1853		Greaves, Abraham	Ironville
1844		Greaves, John	Bakewell
1842		Greaves, Richard	Ripon
1853		Green, Robert Poynton	Witham
1853		Green, George	Selby
1848		Green, John	Birkenhead
1853		Green, William M.	Liverpool
1854	245	Green, James	Droitwich
1849		Greenwell, William C.	Gateshead
1848		Greenwood, John	Harrogate
1853		Greig, William	Glasgow
1852		Griffith, Robert	Carnarvon
1846		Griffith, Richard	Slough
1853		Griffiths, John	Narberth
1853		Griffiths, William	Swansea
1855	18	*Grindley, Robert D.	Chester
1853		Groom, William Bishop	Liverpool

Year of Member-ship.	No. of Certificate.	NAME.	RESIDENCE.
1852		Grounds, George Field	Bishop Stortford
1854	95	Groves, Wellington E.	Blandford
1853	103	Groves, Thomas Bennett	Weymouth
1853		Groves, Edward	Hammersmith
1852		Grundy, Edwin	Lenton
1853		Gudgen, George B.	Kimbolton
1842		Gulliver, Walker Job	Lutterworth
1842		Gunner, George	Winchester
1841		Gurnell, Thomas	Dartford
1846		Guy, Guy	Helston
1841		Gwatkin, James Thomas	Brighton
1852		Gwillim, John Cole	Malvern Link
1853		Hadfield, John	Congleton
1841		Hadfield, William	Congleton
1853		Hadfield, William P.	Newark
1852		Haigh, Joseph	Leeds
1842		Haines, John Jenkins	Bromsgrove
1843		Hall, Joseph	Salford
1852		Hall, Thomas	Newcastle-on-Tyne
1853		Hall, Robert	Camborne
1852	4	Hall, John Richard	Canterbury
1849		Hall, Thomas	Grantham
1842		Hall, George	Huddersfield
1853		Hall, Henry R. F.	Hull
1842		Hall, John Dean	Wycombe
1853		Hall, Richard	Brecon
1849		Hallam, Edward	Axbridge
1859	536	Hallaway, John	Carlisle
1860	434	*Halliday, William Jabez	Manchester
1842		Hallsworth, Thomas	Manchester
1853		Ham, John	Nether Stowey
1841		Hambrook, Odden	Dover
1857		Hambrook, John B.	Dover
1853		Hamilton, Julius	Poole
1858		Hamilton, John T.	Dublin
1846		Hammon, Richard	Folkestone
1855	383	Handley, John	Wakefield
1853		Hannell, Edward W.	Rugby
1853	230	Hardie, James	Dundee
1853		Harding, James John	Sudbury
1853		Hardman, Thomas B.	Liverpool
1853		Hare, Josiah William	Harleston
1852		Hargraves, Henry L.	Oldham
1842		Harold, William	Battle
1842		Harper, Henry	Leamington
1852		Harrington, Arthur	Rochford
1854	203	Harris, William Harry	Northampton
1853		Harrison, Thomas	Leeds
1842		Harrison, Thomas	Bradford
1842		Harrison, James Parker	Carlisle
1847		Harrison, Thomas	Nottingham
1842		Harsant, William	Epsom
1848		Hart, James	Bolton
1852		Hart, Hugh	Glasgow
1853		Hart, George William	Hull

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1841		Hartland, James	Bristol
1853		Hartshorn, William H.	Ironbridge
1841		Harvey, Thomas	Leeds
1843		Harvey, John	Newark
1842		Haselar, Albert	Cranbrook
1848		Hatfull, Robert	Deptford
1853		Hatrick, Robert R.	Paisley
1853		Hatrick, William	Paisley
1853		Hawkins, Henry Ford	Rugeley
1841		Hawxby, Thomas	Tottenham
1847		Haydon, Frederick Walter	Fordingbridge
1842		Haydon, Henry William	Tiverton
1857	447	*Hayes, James	Great Warley, Essex
1853		Hayman, Alfred	Neath
1845		Hayward, William G.	Reading
1845		Hayward, Edward	Ipswich
1853		Hayward, Charles	Manchester
1859	541	*Hayward, Charles John	Lincoln
1853		Hayward, Samuel H.	Gloucester
1847		Hazell, Robert W.	Maidstone
1842		Head, John	Lewes
1842		Headley, Morris	Bridlington Quay
1846		Heald, William	Sleaford
1841		Heath, Edward	Cromer
1845		Heathcote, Thomas Sarl	Newcastle-under-Lyne
1847		Heaton, John Scholes	Manchester
1853	285	Heming, Robert	Sunderland
1842		Heming, Richard George	Worcester
1848		Hempsted, Robert	St. Leonards
1853		Henderson, John	Glasgow
1853		Henley, Henry	Lyme Regis
1853		Henshall, John	Congleton
1853		Hensleigh, Henry	Plymouth
1841		Henson, Matthew	Dunstable
1853		Henthorn, Joshua	Oldham
1853		Herington, Joseph	Leighton Buzzard
1845		Hern, William Henry	St. Austell
1853		Hewett, William Henry	Great Yarmouth
1853		Hewlins, Edward	Leatherhead
1842		Hibbert, Walter	Neath
1845		Hick, Matthew Bussey	Wakefield
1846		Hick, Allan	Wath-upon-Dearne
1845		Hick, Joseph	Bradford
1842		Hickman, Joseph Frederick	Newbury
1852		Hicks, Robert	Lerwick
1853		Hicks, George	Rothesay
1853		Hifley, Richard James	Devonport
1853	96	Higgins, Thomas S.	Huddersfield
1843		Higgins, William	Chester
1842		Higgs, John Seagrave	Market Harborough
1842		Highway, Henry	Walsall
1853	192	Hill, Charles William	Burnley
1842		Hill, Richard	Bruton
1854	246	Hill, Thomas	Norwood
1853		Hill, William	Manchester

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Hill, Simon	Plymouth
1841		Hill, John	Sheffield
1853		Hinchliffe, Ferrand G. U.	Manchester
1853		Hincks, Thomas R.	Chester
1853		Hinds, James	Coventry
1853		Hine, Alfred	Beaminster
1858		Hingston, Andrew H.	Liverpool
1842		Hitchcock, Charles Edmund	Colchester
1853		Hobson, Charles	Beverley
1847		Hodder, Henry	Bristol
1853		Hoddy, Benjamin	Halstead
1852	133	Hodgeton, David	Brechin
1841		Hodgson, Edward	Stockton
1853		Hogg, Henry	Bristol
1853		Hogg, Thomas	Bideford
1853		Holden, Richard	York
1853		Holdsworth, Thomas W.	Birmingham
1854		Holland, William	Market Deeping
1841		Hollier, Elliott	Dudley
1843		Holt, George Palmer	Bexley Heath
1853		Holt, Richard Wylde	Seacombe
1853	13	Hooker, Thomas E.	Wellington
1842		Hooper, Henry	Brighton
1853		Hopper, Richard	Sunderland
1841		Hopwood, Henry J. S.	Richmond, Surrey
1860	404	Hopwood, Thomas S.	Richmond, Surrey
1841		Horncastle, Henry	Sheffield
1841		Horner, Stephen	Hartlepool
1845		Hornsby, John Harwood	Odiham
1857	174	Hornsby, George G.	Bristol
1853		Horsey, James	Portsea
1851		Houghton, James	Liverpool
1853		Houghton, Thomas	Oxford
1859	448	*Houghton, William	Preston
1856	214	Houlton, James	Wetherby
1841		Howard, Robert	Stratford-le-Bow
1853		Howard, John Eliot	Stratford-le-Bow
1853		Howard, Richard	Tunbridge Wells
1842		Howard, John	Manchester
1842		Howman, Philip	Winchcombe
1846		Howorth, James	Doncaster
1855		Howson, Thomas J.	Gateshead
1851		Howson, Thomas B.	Oxford
1842		Hudson, Richard	Kendal
1851	10	Huggins, George Thomas	Barnet
1849		Hughes, Edward	Altrincham
1842		Hughes, Samuel	Stourbridge
1842		Hulbert, Robert Skeat	Basingstoke
1853		Hulme, John Hughes	Norwich
1853		Hulme, Thomas	Oldham
1842		Humphreys, Matthew	Nottingham
1842		Humphreys, Thomas	Birmingham
1851		Hunt, Thomas	Hereford
1855	104	*Hunt, Richard	Andover
1853	135	Hunter, David	Edinburgh

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Hunter, John	Gosport
1842		Huntley, John	Wimborne
1855		Hurdon, James	Appledore
1853		Hurman, John	Bridgewater
1844		Hurst, William T. H.	
1842		Hurst, John	Louth
1842		Husband, Matthew	Exeter
1861	619	Hustwick, Thomas H.	Hereford
1860	497	*Icke, Henry Scott	Birmingham
1853		Iliffe, Thomas	Nuneaton
1853		Ingham, Henry	Wellingore
1853		Ingham, Richard H.	Manchester
1853	306	Isaac, George Washington	Clifton
1852		Iverach, William	Kirkwall
1861	476	*Iverach, John G.	Kirkwall
1854	136	Jaap, John	Glasgow
1842		Jackson, William George	Hartlepool
1841		Jackson, Thomas	Manchester
1852	105	Jackson, William	Crediton
1853		Jackson, Henry	Liverpool
1845		Jackson, Edmund	Lancaster
1842		James, John	Truro
1853		James, John Parry	Cardiff
1853		James, Henry	Bognor
1853		Jameson, Walter C.	Bath
1853		Jefferson, Peter	Leeds
1848		Jeffery, Moses Williams	Devonport
1853		Jeffrey, Russell	Cheltenham
1846		Jenkins, Henry Maine	Christchurch
1853		Jenkins, John	Peterchurch
1859		Jenner, William M.	Sandgate
1855	286	Jennings, John Edgell	Southampton
1841		Jennings, William	Halifax
1842		Jennings, Reginald	Hereford
1844		Jennings, John E. H.	Sheffield
1853		Jessop, Jonathan	Halifax
1852		Jobson, William	Dundee
1858	390	Johnson, George	Birmingham
1853		Johnson, Thomas	Leek
1841		Johnson, John H.	Liverpool
1853		Johnson, John B.	Uttoxeter
1841		*Johnson, Samuel	Liverpool
1853		Jones, John	Aberdare
1848		Jones, Charles	Birkenhead
1842		Jones, Edward Bowen	Carmarthen
1841		Jones, Charles	Hanley
1842		Jones, William	Hastings
1845		Jones, John	Holywell
1841		Jones, William B.	Kingston-on-Thames
1845		Jones, Samuel Urwick	Leamington
1842		Jones, William	Liverpool
1859	465	Jones, Humphrey	Llangollen
1853		Jones, David	Narberth
1853		Jones, Thomas J.	Newport
1853		Jones, Ellis Powell	Rhyl

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1848		Jones, James	Salford
1853		Jones, William Thorpe	Southwell
1847		Jones, James	Newcastle-on-Tyne
1844		Jones, Oliver Ellis	Welshpool
1853		Jones, Thomas	Welshpool
1857	115	*Joy, Francis William	Cardiff
1859	473	Judd, William	Christchurch
1842		Judson, Thomas	Ripon
1846		Jull, Thomas	Horsham
1853		Keall, Powell Skinner	Bristol
1845		Keeling, George Ratcliffe	Epsom
1852		Keene, Alfred	Leamington
1853		Keith, James	Aberdeen
1852	137	Kemp, David	Portobello
1841		Kemp, Grover	Brighton
1854		Kemp, John	Brighton
1848		Kemp, William	Horncastle
1861	418	Kemp, David Skinner	Bombay
1841		Kendall, Frederick	Stratford-on-Avon
1844		Kendall, George	Masham
1853		Kennedy, William	Glasgow
1853		Kent, Alfred	Basingstoke
1861	601	*Kent, Frederick William	Bath
1852		Ker, Thomas	Edinburgh
1853		Kernick, Samuel Penrose	Cardiff
1843		Kernot, Joseph	Naples
1843		Kernot, Septimus	Naples
1847		Kershaw, James	Southport
1842		Kiddy, Samuel	Belper
1841		Kimbell, Henry	Knowle
1852		Kinder, John	Glossop
1842		King, Joseph Raymond	Bath
1853		King, William George	Market Drayton
1841		King, Thomas Simmons	Rochester
1853		King, William	Soham
1853		King, Charles Montague	Southend
1853		King, Ellis	Southend
1858	234	Kinninmont, Alexander	Glasgow
1854	276	Kirk, John	Maidstone
1853		Kirk, Charles	Hartley Row
1853		Kirk, Thomas	Liverpool
1853		Kirkbride, William	Penrith
1859	299	Kirkman, George B	Bishop Stortford
1842		Kitching, Charles	Haverhill
1853		Knapman, John	Exeter
1854		Knight, Joseph	Bath
1842		Knight, Edward Sackville	Bridport
1858		Knight, John	Cambridge
1843		Knight, Alfred	Margate
1841		*Knott, Thomas	Exeter
1844		Knowles, Richard John	Demerara
1852		Knowles, John J	Sandwich
1853	187	Laird, William	Dundee
1853		Lamotte, Thomas Gallye	Bristol
1853		Lancaster, Henry	Croydon

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Lane, Joseph	Hampstead
1842		Langford, William	King's Lynn
1858	100	Langman, Peter	Chatteris
1843		Lansdale, Ralph	Wycombe
1853		Lasham, John	Dedham
1841		Lathbury, Robert	Liverpool
1842		Lavers, Thomas Howard	Blackheath
1853		Law, William	Forfar
1842		Lea, Henry Clairmont	Hastings
1853		Lea, Samuel	Ellesmere
1841		Lea, John Wheeley	Worcester
1859	183	*Lea, Charles Wheeley	Worcester
1853		Leach, John	Crawley
1855		Leadbetter, William Austin	Melton Mowbray
1841		Leay, Joseph	Birmingham
1853		Leighton, John H.	Durham
1852		Leith, James	Edinburgh
1853	138	Lever, William	Hastings
1853		Lewin, Edward C.	Boston
1841		Lewin, William	Plymouth
1856	310	Lewis, Thomas Cooper	Rugby
1842		Lidington, George	Bilston
1857		Limon, Henry	Burgh
1847		Lindo, Benjamin	Dover
1841		Lindsay, Robert	Edinburgh
1841		Lines, George	Hertford
1849		Linsley, Thomas	York
1844		Lister, George	Cottingham
1854	215	Littlefield, James Wavell	Ventnor, Isle of Wight
1842		Lloyd, Edmund	Richmond
1856	436	Lloyd, Henry	Richmond
1853		Lloyd, Henry	Deptford
1853		Lock, William	Boston
1846		Lockyer, George	Deptford
1841		Lofthouse, James	Hull
1859	236	Logan, Richard	Edinburgh
1853		Loggin, Charles Frederick	Stratford-on-Avon
1859		Long, William Elliot	Chichester
1858	479	Long, Henry	Croydon
1853		Longfield, Joseph	Leeds
1853		Longrigg, John	Appleby
1853		Lord, Ellis	Rochdale
1853		Lord, Charles	Todmorden
1841		Lovett, John	Gloucester
1853		Loveridge, Thomas	Merthyr Tydfil
1841		Lowe, Thomas	Liverpool
1842		Lowndes, Hervey	Stockport
1841		Loye, Philip	Plymouth
1853		*Luff, William	Oxford
1853		Lumsden, James	Peterhead
1842		Lynch, John R.	Manchester
1842		Mabson, William	Great Yarmouth
1852	139	Macfarlane, Wardlaw	Edinburgh
1853		McDiarmid, John B.	Deal

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		McGregor, Andrew	Glasgow
1841		Mackay, John	Edinburgh
1852		Mackenzie, Duncan	Edinburgh
1852		Mackintosh, Archibald	Rothesay
1856	140	Mackintosh, James	Galashiels
1841		Maddock, William	Tunbridge Wells
1853		Madge, James C.	Devizes
1848		*Maggs, Samuel Blount	St. Leonards
1845		Maggs, Thomas C.	Yeovil
1845		Maleham, Henry	Sheffield
1842		Manfield, John W.	Salford
1853		Manifold, John J.	Weaverham
1859		Mann, Robert	Newcastle-on-Tyne
1841		Manthorp, Samuel	Colchester
1850		March, William	Newark
1845		Marder, James Wood	Lyme Regis
1857	481	*Maries, Henry Davies	Watford
7846		Marks, George	Bradford-on-Avon
1853		Marlor, Jabez	Lees, near Oldham
1849		Marrison, George O. R.	Tasmania
1845		Marsden, Joseph	Middleton-on-Tees
1842		Marsh, William M.	Sevenoaks
1842		Marshall, John F.	Gainsborough
1853	311	Marshall, Robert	Boston
1842		Marshall, James A.	Waltham Abbey
1842		Marston, Richard	Ludlow
1841		Martin, John	Bristol
1842		Martin, Edward W.	Guildford
1845		Martin, Thomas	Lewes
1853		Martin, Thomas	Liverpool
1851		Martin, Henry G.	St. Albans
1853		Martyn, John Jones	Brighton
1853		Mason, Joseph W.	Cirencester
1842		Mason, William W.	Manchester
1853		Mason, William	Hastings
1853		Mather, William	Manchester
1853		Maunder, Alexander	Weston-super-Mare
1848		Maunder, Frederick	Sheffield
1853		Mawson, John	Newcastle-on-Tyne
1842		May, Enoch	Tewkesbury
1848		Maynard, Robert H.	Brandon
1842		Mays, Robert James John	South Shields
1843		Meadows, John	Leicester
1842		Mease, Solomon	North Shields
1853		Mease, Robert D.	North Shields
1842		Meatyard, Robert	Basingstoke
1842		Medcalf, Benjamin	Ware
1843		Medcalf, Ebenezer	Lower Tooting
1853		Medd, Joseph	Gloucester
1857	215	Medley, William	Derby
1845		Medwin, Aaron	Blackheath
1859	507	*Mercer, Nicholas	Fairfield
1853		Meredith, Edwin Richard	Bristol
1850		Merrick, Thomas J.	Northampton
1853		Merryweather, Charles	Leicester

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1854	106	*Metcalfe, Christopher L.	Hull
1861	621	*Metcalfe, John Sykes	Preston
1853		Millais, Thomas	Jersey
1853		Miller, Jeptha	Saffron Walden
1842		Miller, Charles	Oxford
1843		Miller, Robert P.	Reading
1853		Miller, William Henry	Sheffield
1853		Miller, John Thomas	Sheffield
1847		Mitchell, John	Manchester
1842		Mole, William Tingey	St. Neots
1844		Morris, Alfred Philip	Stourbridge
1844		*Morse, George	Mortlake
1852		Morton, John	Durham
1853		*Morton, Jameson	Ramsbottom
1845		Morton, Henry	Ramsgate
1844		Morton, George	Stratford-le-Bow
1849		Moss, William	Carlisle
1853		Mount, William	Canterbury
1842		Mount, John	Manchester
1853		Mousley, William	Redditch
1841		Mullett, Charles	Ilminster
1847		*Mumbray, Robert Goodwin	Richmond, Surrey
1853		Mumby, Charles	Gosport
1853		Munday, Edward Smith	Worthing
1853		Murdoch, David	Falkirk
1852	63	Murdoch, George	Glasgow
1849		Murdoch, James	Glasgow
1841		Muriel, Harry Brooke	Brighton
1842		Muskett, James	Harleston
1844		Musson, Telemachus G.	Birmingham
1848		Naftel, Thomas P.	Guernsey
1842		Napier, James	Edinburgh
1853		Narracott, Henry	Torquay
1842		*Negus, Samuel	Northampton
1853		Newbery, Henry	Biggleswade
1853		Newby, William Henry	Perth
1853		Newcome, John	Grantham
1854		Newman, Robert	Bewdley
1845		Newman, Thomas	Hartley Row
1853		Newman, Walter F.	Falmouth
1853		Newton, George	Newcastle
1853		Nicholas, John	Narberth
1841		Nicholls, James	Stourbridge
1852		Nicol, George	Pulteney Town
1845		Nind, George	Wandsworth
1853		Nix, John K.	Billericay
1841		Noakes, Richard	Brighton
1858	522	Noble, Alexander	Edinburgh
1846		Northcroft, Jonathan	Plymouth
1853		Norwood, Thomas	Hastings
1842		Oakey, Joseph Malpas	Preston
1853		Oldham, William Thomas	Wisbeach
1853		Oliver John	19, St. James' Pl., Liverpool
1842		Orange, John	Portsea

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1845		Otter, William	Bloxham
1842		Overbury, Henry	Alcester
1845		Owen, Griffith	Caernarvon
1842		Owen, William	Newcastle-on-Tyne
1845		Owles, James	Bungay
1842		Owles, John	Yarmouth
1842		Paine, William	Canterbury
1841		Palk, Edward	Southampton
1841		*Palk, John	Exeter
1847		Palmer, Faithful	Cheltenham
1842		Palmer, Thomas J.	East Grinstead
1853		Palmer, Charles Fielding	Birmingham
1842		Parker, Edward	Carlisle
1853		Parker, Frederick	Derby
1853		Parker, John	Birmingham
1853		Parker, Matthew	Bath
1853		Parker, William Henry	Nottingham
1841		Parker, Thomas	Halifax
1842		Parkes, Joseph	Atherstone
1853		Parkes, John C.	Woolwich
1854	312	*Parkes, John P.	Manchester
1842		Parkinson, Thomas	Liverpool
1847		Parkinson, Robert	Bradford
1841		*Parnell, John	Peterborough
1842		Parsons, Thomas	Leicester
1850		Parsons, William	Portsmouth
1853		Pasmore, George	Portsmouth
1853		Pate, Henry Thomas	Ely
1853		Paterson, William	Aberdeen
1853		Patterson, George	Stamford
1858	453	*Patterson, Douglas John	Mansfield
1853		Pattinson, Richard John	Carlisle
1841		Paul, Horace	Halstead
1853		*Paulden, William	Altrincham
1841		Payne, Reuben Craven	Bridgewater
1854	314	Peake, Henry	Dover
1855	313	Peake, James	Walmer
1842		Pearce, Thomas	Gloucester
1852		Pearless, John	East Grinstead
1853		Pearman, Henry	Newport, Monmouth
1842		Pearson, Charles James	Loughor
1842		Peart, David	Ewell
1842		Peat, Walter	Fareham
1853		Peatson, Henry Robert	Salford
1853		Pegg, Herbert	Birmingham
1852		Penney, William	Poole
1853		Penrice, Joseph	Workington
1851		Peppercorn, Benjamin	Lincoln
1855		Perfect, George	Portsea
1841		Perrins, William	Worcester
1843		Perry, Solomon	Tavistock
1853		Pertwee, Edward	Romford
1853		Pertwee, Alfred R.	Chelmsford
1853		Phillips, John	Birmingham
1852		Phillips, Edward James	Newport, Monmouth

No. of Certificate.	Year of Membership.	NAME.	RESIDENCE.
1853		Phillips, John	Newport, Monmouth
1856	326	Phillips, William Thomas	Carmarthen
1845		Philpott, John	Bromyard
1842		Pickering, Henry	Leicester
1853		Pickering, Atkinson	Hull
1845		Pickup, Thomas Hartley	Blackburn
1841		Pickup, John	Manchester
1848		Pickup, Varey	Salford
1859	301	*Picnot, Charles	Strood
1853		Pidgeon, Henry	Shrewsbury
1853		Pidgeon, John	Taunton
1841		Pierce, Edward Lloyd	Shelton
1853		Pilley, Samuel	Boston
1853		Pilley, John	Boston
1853		*Piquet, John	Jersey
1853		Pissey, William	Rayleigh
1853		Pitts, Robert Christopher	Norwich
1859	289	Place, William Thomas	Wakefield
1853		Player, Edmund	Bristol
1842		Plomley, James Foulis	Rye
1842		Pocklington, James	Sydenham
1853		Pollard, William J.	Nailsea
1852		Ponting, Thomas Cadby	Bristol
1845		Pooley, John Carpenter	Bath
1846		Portway, John	Bury St. Edmunds
1853		Potts, Thomas	Newcastle-on-Tyne
1855		Poulton. John	Newton Abbot
1852		Powell, Frederick W.	Leith
1842		Powell, John	Shaftesbury
1842		Powell, Edward	Winchester
1852		Power, Edward	Walton-on-Thames
1841		Pratt, John	Chichester
1846		Pratt, John	Bradford
1853		Pratt, Richard Munton	Otley
1853		Priestlay, Henry	Pontefract
1841		Priestley, John	Liverpool
1852		Prince, Henry	Taunton
1855	290	*Pring, Walter	Taunton
1855		Prior, George T.	Oxford
1842		Prockter, Richard Edgcumbe	Cheltenham
1841		*Procter, William	Settle
1848		Proctor, William	Newcastle
1841		Proctor, William B.	Newcastle
1857		Proctor, Barnard S.	Newcastle
1853		Procter, Joseph	Beverley
1859	384	*Prosser, Thomas Evan	Woodstock
1852	144	*Prott, William	Huntley
1842		Prout, Robert	Milton Abbot
1853		Pryer, William Symes	Axminster
1852		Pullin, Edwin	Northampton
1841		Purdue, Thomas	Witney
1855	355	*Pyne, Joseph J.	Manchester
1853		Quine, James	Douglas, Isle of Man
1851		Radford, Isaiah C.	Devonport
1841		Radley, William Valentine	Sheffield

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Raimes, Richard	Edinburgh
1854	302	Rainey, Edward	Spilsby
1853		Rait, Robert C.	Partick
1853		Ralfs, Henry Charles	Brentford
1841		Ramskill, Parson	Leeds
1841		Randall, Edward Mayor	Southampton
1845		Randall, William Brodribb	Southampton
1853		Randall, Thomas	Wareham
1853		Randleson, William	Whitehaven
1853		Ranken, James Anderson	Forfar
1848		Rankin, William	Kilmarnock
1842		Ransford, Samuel	Cleveden
1853		Ransom, William	Hitchin
1853		Ransome, Thomas	Manchester
1851		Rastrick, George T.	Geelong
1853		Rastrick, William Henry	Portsea
1842		Rastrick, Joseph Linington	Southsea
1842		Rastrick, John Alfred	Woolwich
1853		Rawdin, Joseph	Jedburgh
1841		Rawle, William	Cranley
1854	206	Rayner, John	Nottingham
1852		Rayner, John	Uxbridge
1859	543	*Rayner, John Charles	Uxbridge
1859	408	Rayner, William	Sheerness
1842		Reading, Robert Grant	Warwick
1841		Readman, William	Leighton Buzzard
1842		Redfern, John	Ashby-de-la-Zouch
1853		Redmayne, Christopher	Warrington
1853		Rees, William Henry	Dartmouth
1853		Reid, David	Aberdeen
1853		Reid, John	Montrose
1857	251	Reid, Neil	Perth
1856		Reilly, William Charles	Hampstead
1845		Reinhardt, Johaan Christian	Leeds
1841		Reinhardt, George	Leeds
1848		Rendall, John M.	Torquay
1842		Reynolds, William	Halesworth
1854	109	Reynolds, Richard	Leeds
1849		*Rhodes, Frank	Spalding
1853		Rhodes, James	Manchester
1853		Rich, Thomas	Weston-super-Mare
1853		*Richards, William	Falmouth
1853		Richardson, Allen	Manchester
1842		Richmond, Robert	Leighton Buzzard
1842		Rimmington, Felix U.	Bradford
1842		Ritson, John George	Sunderland
1842		Ritson, Thomas	Sunderland
1847		Roberton, James	Manchester
1853		Roberts, Thomas A.	Conway
1852		Roberts, Griffith J.	Holyhead
1842		Roberts, Charles	Westbury
1841		Roberts, Albinus	St. Albans
1858	483	*Roberts, Peter	Denbigh
1852		Robertson, James	Edinburgh

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853	331	*Robertson, Thomas Berkley	Cullen
1854		Robinson, Levi	Alford
1842		Robinson, James Mowld	Beverley
1855	249	Robinson, Ralph	Lynn
1855	193	Robinson, Benjamin	Pendleton
1851		Robson, Thomas	Brighton
1842		Robson, George	Durham
1853		Rodgerson, William	Liverpool
1847		Roe, Septimus	Salisbury
1842		Roe, Thomas	Ollerton
1853	5	Rogers, John Robinson	Honiton
1853		Rogers, William	Maidstone
1842		Rogers, John	Ledbury
1842		Rogerson, Michael	Bradford
1853		Rome, Robert M.	Langholm
1853		Rook, Edward	Sittingbourne
1853		Rooker, Abel	Chepstow
1851		Roose, Robert	Flint
1845		Ross, Stephen	Lancaster
1853		Row, Charles	Devonport
1843		Rowe, John	Plymouth
1853		Rowland, Thomas	Epping
1853		Rowland, William S.	Devizes
1846		Russell, Thomas	South Shields
1853	84	Russell, Charles J. L.	Windsor
1853		Rust, James	Thaxted
1853		Rutherford, Thomas H.	Seaham Harbour
1853		Sagar, Henry	Leeds
1841		Salisbury, John	Sheffield
1858	219	Salisbury, William Bryan	Leicester
1842		Sanders, Henry Wotton	Bristol
1847		Sandiland, Robert B.	Bicester
1853		Sangster, John	Aberdeen
1853		Satterley, William B.	Guernsey
1845		Saunders, David Price	Haverfordwest
1853		Saunders, George J.	Oswestry
1841		Savage, William Dawson	Brighton
1841		Sawyer, Thomas	Ramsgate
1853		Sawer, William	Nayland
1842		Sawyer, James	Carlisle
1853		Saxby, Henry	Lewes
1852		Scarrow, William	Sunderland
1846	2	Schacht, Frederick George	Clifton
1853		Scott, Edward	Birmingham
1857	317	Scott, George	Bury St. Edmunds
1856	426	Searby, William M.	Vancouver's Island
1854	239	Seath, Alexander	Dunfermline
1847		Seaton, John Love	Hull
1849		Seaton, George	Chelmsford
1841		Selfe, Isaac	Bristol
1843		Severs, Joseph	Kendal
1846		Sewell, James C.	Sheffield
1853		Sewell, John Holmes	Swindon
1841		Seyde, John F.	Willenhall
1841		Shackel, John Well	Maidenhead

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Shadford, Major	Spalding
1853		Sharland, Edmund T.	Bristol
1853		Sharp, Benjamin	Liverpool
1847		Sharp, Henry	Christchurch
1843		Sharples, George	Preston
1853		Shattock, John	Taunton
1848		Shaw, John	Liverpool
1842		Shaw, Alexander Henry	Stockport
1854		Shenstone, James B.	Colchester
1853		Shepherd, James	Aberdeen
1857	371	Shepherd, George Prentis	Guildford
1848		Shepperley, James	Nottingham
1853		Shield, Spooner	Liverpool
1852		Shield, George	Arbroath
1842		Shillcock, Joseph Bradley	Bromley, Kent
1841		Shum, Henry	Swansea
1853		Sidebottom, William	New Mills
1842		Silvester, Joseph	Knutsford
1853		Sim, James	Aberdeen
1853		Sim, George	Kelso
1842		Simonds, William	Boston
1843		Simpson, John	Hull
1842		Simpson, Thomas	Stowmarket
1853		Sinclair, William	Aberdeen
1852		Sircom, Richard	Bristol
1841		Sirett, George	Buckingham
1861	207	Skrimshire, Thomas	Norwich
1853		Slayter, George	Reading
1853		Smale, Richard Bill	Oswestry
1843		Smallwood, John Wright	Macclesfield
1853		Smart, Nevill	Littlehampton
1841		*Smeeton, Edward	Leeds
1859	454	*Smeeton, William	Ironbridge
1853		Smethurst, Richard L.	Salford
1853		Smith, John	Aberdeen
1842		*Smith, William	Abingdon
1853		Smith, William	Bridlington
1853	169	Smith, William	Brighton
1841		Smith, Nathaniel	Cheltenham
1841		Smith, Thomas	Colchester
1853		Smith, Henry	Eccleshall
1853		*Smith, Thomas	Edinburgh
1842		Smith, Henry	Edinburgh
1853		Smith, James S. T. W.	Haltwhistle
1856	416	*Smith, Thomas J.	Hull
1842		Smith, William	North Shields
1849		Smith, William	St. Andrews
1843	31	Smith, John	Southampton
1842		Smith, William	Sutton Coldfield
1842		Smith, Alfred	Tenterden
1842		Smith, James Russell	Woodbridge
1842		Smith, William	Woolwich
1860	603	*Smith, James Taylor	Kilmarnock
1853		Smyth, Walter	Merthyr Tydfil
1842		Snape, Edward	Birmingham

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1841		Snowdon, George Wrangham	Wimbledon
1841		Southall, William	Birmingham
1850		Southall, William, jun.	Birmingham
1859	534	*Southall, Joseph Sturge	Nottingham
1842		Sowerby, John	Carlisle
1852		Spence, Thomas B.	Dundee
1843		Spencer, Charles	Gravesend
1853		Spencer, William Henry	Burnham Market
1853		Spencer, Thomas	Wokingham
1853		Spencer, George	Lincoln
1842		Spettigue, Joseph	Launceston
1842		Spicer, Thomas	East Moulsey
1853		Spokes, Peter	Reading
1845		Spong, Thomas Willsden	Biggleswade
1853		Spurr, John	York
1842		Squire, William	Hanwell
1853		Squire, William	Nottingham
1853		Squire, William	Goole
1853		Stafford, William	Gloucester
1842		Standring, Thomas	Manchester
1860	480	*Stanford, Edward C. Cortis	Worthing
1842		Stantial, John	Corsham
1847		Stead, William	Horbury
1856	291	Steel, Henry	Shefford
1853		Steel, Samuel	Beccles
1855	148	Steel, David	Edinburgh
1853		Stephens, Thomas	Merthyr Tydfil
1858	492	*Stephenson, John B.	Edinburgh
1853		Sterriker, John	Driffield
1849		Stevens, John	Birmingham
1852		Stevens, George	Strood
1846		Stevenson, Richard	Derby
1842		Steward, Charles S. Dale	Yarmouth
1854	278	Steward, Alfred	Yarmouth
1847		Steward, William	Bridgnorth
1841		Steward, Josiah	Kidderminster
1841		Steward, Theophilus	Kidderminster
1853		Steward, John	Brierley Hill
1858		Stewardson, Henry	Bedford
1841		Stiell, Gavin	Dunfermline
1858	491	*Stirling, George	Dunoon
1853		Stoddart, William Walter	Bristol
1853		Stone, John	Exeter
1852		Stonham, Thomas G.	Maidstone
1841		Stott, William	Sowerby Bridge
1853		Strange, William Bond	Bristol
1847		Strawson, Henry	Crewkerne
1856	292	Stroud, John	Bristol
1842		Stuart, Charles	Woolwich
1853		Stuart, Henry W.	Woolwich
1853		Sturton, Joseph	Cambridge
1841		Sturton, John	Peterborough
1855	394	*Sturton, Richard	Peterborough
1852		Sumner, Robert	Liverpool

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1855	170	Sumner, William	Birmingham
1852		Sumner, John	Birmingham
1853		Sutherland, John	Aberdeen
1853		Sutterby, Jonathan N...	Long Sutton
1853		Sutton, Francis	Norwich
1860	573	*Sutton, Charles William	Stowmarket
1853		Swindells, Frederick M.	Blackpool
1843		Symonds, John	Aylsham
1852	149	Tait, William	Edinburgh
1841		Tanner, Nicholas William	Exeter
1853		Taplin, Joseph	Bristol
1847		Tarzewell, Richard	Braintree
1841		Tatham, John Walkingame	Barnstaple
1852		Tatham, Leonard F.	Bradninch
1845		Tayler, William Henry	Warminster
1848		Taylor, John Usher	Bedford
1842		Taylor, James	Manchester
1842		Taylor, Thomas H.	Manchester
1850		Taylor, Sydney	Pendleton
1841		Taylor, John	Preston
1853		Taylor, Thomas John	Preston
1842		Taylor, Edward	Rochdale
1854	362	Taylor, Richard	Ryde
1852		Taylor, John	Wakefield
1841		Taylor, William James	Middlesborough
1848	7	Teasdale, Thomas B.	Darlington
1842		Teear, John Manshaw	Leicester
1853		Templeton, John	Glasgow
1842		Thomas, John Holliday	Boston
1852		Thomas, Robert	East Looe
1846		Thomas, Richard	Burnley
1853		Thomas, John	Cowbridge
1853		Thomas, James	Bridge, Kent
1853		Thomas, James	Hythe
1853		Thompson, George	Alston
1846		Thompson, Andrew	Carlisle
1849		Thompson, John	Liverpool
1842		Thompson, Henry	Middlesborough
1853		Thompson, Henry	Norwich
1846		Thompson, Edward	Otley
1850		Thompson, Thomas	Richmond, Yorkshire
1853		Thompson, William	Sunderland
1859	502	Thompson, John Robert	Bishopwearmouth
1841		Thompson, John	Thirsk
1853		Thonger, Gilbert	Birmingham
1853		Thorne, John	Bedford
1853		Thornton, John	Wedmore
1853		Thornton, Edward	Lyme Regis
1842		Thornton, Samuel	Exmouth
1857	417	Thornton, John Barber	Dover
1853		Thurland, Edward	Oxford
1853		Tiernan, Robert	Liverpool
1853		Timothy, Thomas Norris	Reading
1841		Titherington, Thomas A.	Liverpool

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1843		Tomlinson, Charles Knowles	Lincoln
1847		Tonge, James Scawin	York
1853		Toone, Joseph Vidler	Warminster
1853		Townsend, John H.	Bristol
1842		Tozer, Richard John	Exeter
1841		Tribe, John	Chatham
1841		*Trix, John	Exeter
1841		Trueman, William	Durham
1841		Tryon, William George	Portsea
1842		Tuck, William H.	Gosport
1857	342	*Tuck, Francis	Oxford
1843		Tucker, Charles	Bridport
1853		Tucker, James	Gloucester
1853		Tuff, John	Enfield
1842		Tunley, John	West Bromwich
1853		Turner, Robert	Oundle
1856	264	Turner, Walter	Mold
1851		Turner, Frederick E.	Holywell
1854	265	Turner, William Henry	Oswestry
1848		Turner, John A.	Liverpool
1853	162	Turney, Samuel B.	Plymouth
1853		Turton, Luke	Bradford
1853		Turton, Thomas J.	Howden
1859	516	*Twinberrow, John	Worcester
1841		Tylee, John P.	Bath
1842		Uppleby, Henry	Leamington
1853		Urquhart, James	Aberdeen
1853		Veitch, James	Dunse
1853		Veitch, William	Shildon
1845		Vincent, Philip	Fulham
1853		Vose, Thomas	Liverpool
1842		Wain, William	Ripley
1842		Wainwright, James	York
1842		Waite, Joseph	Cheltenham
1853		Walker, John C.	Ventnor
1853		Walker, John	Bradford
1841		Walker, George Clarke	Jersey
1842		Walker, Edward Hawxby	Doncaster
1842		Walker, William	Malmesbury
1847		Walker, Edward	Newcastle-on-Tyne
1846		Walker, William Henry	Southport
1842		Walkinton, William	Tenby
1848		Wall, William James	Tottenham
1857	75	Wallworth, David	Maldon
1860	266	Walmsley, Samuel	Kingston-on-Thames
1854	343	Walsh, Edward	Manchester
1852		Walsh, William	Oxford
1861	595	*Walsh, Edward	Oxford
1853		Walter, Joseph	Horncastle
1848		Walton, John	Sunderland
1842		Warburton, Thomas	Bolton
1841		Ward, James	Falkingham
1853		Ward, Francis	Battle
1851		Ward, William	Sheffield

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Wardle, William Henry	Stalybridge
1842		Warrior, William	Northallerton
1853		Waterall, George	Nottingham
1853		Waterall, George Edwards	Nottingham
1853		Waterfall, William	Newcastle
1842		Watkins, George H.	Walsall
1853		Watkinson, Thomas	Cinderford
1841		Watlock, John Dawson	Wandsworth
1853		Watlock, Benjamin D.	Battle
1846		Watson, Henry	Cambridge
1847		Watson, Edward M.	Worle
1859	517	*Watson, David	Kettering
1853		Watt, James	Haddington
1853		Wavell, John	Ryde
1853		Wearing, William	Lancaster
1853		Wearing, William Henry	Liskeard
1848		Wearing, Richard	Liverpool
1842		Weaver, Frederick	Wolverhampton
1853		Webber, George William	Torquay
1853		Webster, Edwin P.	Newcastle-on-Tyne
1852		Webster, Samuel M.	Warrington
1853		Welch, Charles	Nottingham
1844		Weller, George	Windsor
1850		Wellington, Frederick G. N.	South Petherton
1842		Wellington, James Martin	Oakham
1853		Wellman, William Richard	Jersey
1852		Welsh, Alexander	Dalkeith
1853		West, Henry James	Coventry
1856		West, William	Henfield
1846		Westall, Richard H.	Ramsgate
1853		Westmacott, George	Manchester
1854	180	Wharrie, Decimus	Liverpool
1854	156	*Wheeler, Francis	Norwich
1847		Wheeler, John	Chipping Sodbury
1846		Wheeler, James Edward	Ryde
1842		Whimpray, John	Lancaster
1853		Whitall, James	Chertsey
1853		White, Frank	Nottingham
1842		White, Robert Rowles	Dursley
1842		White, Thomas	Bilston
1846		Whitehead, Edwin	Fleetwood
1853		Whitehead, John	Rochdale
1842		Whitfield, John Lockley	Worcester
1847	16	Whitfield, John	Worcester
1846		Whitlock, Edwin	Salisbury
1853		Whittaker, William	Runcorn
1852		Whittaker, Ellis	Salford
1853		Whittle, Samuel	Leigh
1841		Whitton, George	Horncastle
1852		Whitwell, John	Thirsk
1845		Wibmer, Lewis Michael	Tunbridge
1853		Wice, Jonathan Haigh	Wakefield
1849		Wickham William	Deptford
1842		Wigg, John Goddard	Lynn

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1845		Wiggin, John	Ipswich
1853		Wild, Joseph	Hyde
1853		Wild, David	Oldham
1847		Wilde, Eli	Manchester
1852		Wilkes, Seth Martin	Tewkesbury
1850		Wilkes, Doctor Tyers	Upton-on-Severn
1842		Wilkes, William	Bromyard
1858		Wilkes, David	Bredon
1850	73	Wilkinson, William	Manchester
1854		Williams, Joel D.	Bodmin
1853		Williams, William	Haverfordwest
1844		Williams, Walter	Hereford
1853		Williams, Philip	Horsham
1853		Williams, John	Leamington
1853		Williams, Robert	Liverpool
1854		Williams, Terrick J.	Liverpool
1853		Williams, Edwin	Manchester
1857	474	*Williams, Henry Levi	Newport, Monmouth
1842		Williams, David	Pwllheli
1859	531	*Williams, Thomas Kemble	Welchpool
1861	399	Williams, John Thompson	Swansea
1844		Williamson, James	Hunslet
1853		Willmott, Charles	Brighton
1855	171	Wills, Thomas D	Barnstaple
1853		Wilshaw, James	Wordsley
1842		Wilson, Thomas	Bradford
1844		Wilson, Joseph	Canterbury
1853		Wilson, John	Harrogate
1855	303	Wilson, Joseph	Penrith
1853		Wilson, Edward	Sheffield
1841		Wilson, Charles Thomas	Swansea
1854		Wilson, William	York
1860	152	Wilson, James	Edinburgh
1841		Wine, John	Bristol
1842		Wing, Thomas N.	Melton Mowbray
1856	254	Wingate, Stephen	Gloucester
1847		Withers, Richard	Blackwater
1842		Witherington, Thomas	Worcester
1853		Withey, William Henry	Stroud
1842		Wood, Edwin	Abersychan
1853		Wood, Anthony	Arnold
1846		Wood, Henry	Brentford
1852	111	Wood, Edward	Brighton
1853		Wood, Benjamin	Halifax
1853		Wood, John Edward	Harlow
1842		Wood, William Webb	Pontypool
1853		Woodcock, Page D	Lincoln
1842		Woods, William	Worcester
1853		Woodward, Charles	Ryde
1853		Woodward, William	Langport
1842		Wooldridge, Thomas	Windsor
1858	521	*Woolley, George Stephen	Manchester
1844		Woolley, Daniel	Stockport
1854		Woolrich, Thomas	Stone
1850		Wootton, William	Wolverhampton

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1856	255	Wortley, John	Durham
1842		Wreaks, Thomas Peacock	Glossop
1842		Wreaks, George D	Sheffield
1853		Wright, Joseph	Ardwick
1853		Wright, James	Chesterfield
1853		Wright, William	Liverpool
1846		Wright, George Warren	Macclesfield
1842		Wright, Charles	Manchester
1853		Wright, Thomas Williams	Buckley
1853		Wyatt, Samuel	Tottenham
1845		Wylde, John	Manchester
1845		Wylde, James	Manchester
1841		Wyley, John	Coventry
1852	153	Young, James R	Edinburgh
1844		*Young, John	Sunderland
1853		Young, Tonkin	St. Ives
1853	224	Youngman, Edward	Bury St. Edmunds
1855	345	*Youngman, Robert	Cambridge

ASSOCIATES

ADMITTED BEFORE THE 1st OF JULY, 1842

NAME.	RESIDENCE.
Baigent, William H.	London
Barber, William Jas.	London
Beaton, John William	London
Bell, William	Carlisle
Brewster, Godfrey W.	Cambridge
Brown, Henry F.	London
Buss, Thomas	London
Chadwick, Henry	London
Charity, William	Alford
Dallas, John	London
Dunn, Edward	London
Handsley, Taylor	London
Lee, James	London
Mackay, John	Worcester
Mackey, John B.	London
Middleton, Francis	London
Morgan, William B.	London
Peat, William H.	Ryde
Roberts, William	Bolton
Sawyer, Henry	Ramsgate
Scholefield, Henry	London
Selleck, Edward	London
Steele, John W.	London
Sylvester, Paul	Birmingham
Thompson, Morley	London
Townsend, Charles	London
Turner, George	Honiton
Walker, William	Malmesbury
Were, Ellis	London
Wood, John	London

ASSOCIATES OF THE SOCIETY

WHO HAVE PASSED THE MAJOR EXAMINATION.

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1849	76	Alexander, William	Peckham
1857	477	Andrew, Leyshon	Swansea
1851	533	Anthony, John Lilley	Bedford
1858	510	Ashton, John	Belper
1859	562	Austin, Henry Felix	London
1846	424	Barker, Matthew Mark	York
1854	551	Barnes, Edwin	Durham
1854	374	Barnsby, Robert David	Tours
1853	256	Barry, Thomas	Aberavon
1860	626	Bartlett, James	Bath
1860	608	Bass, James	London
1857	597	Bearcroft, Richard James	Cheltenham
1860	589	Bell, William Henry	Whitehaven
1853	346	Bennett, Robert	Lincoln
1853	576	Bennett, George	Blandford
1855	496	Berger, Volcy	Clapham
1855	622	Birch, Henry Cooper	Richmond, S.W.
1852	208	Blackburn, Francis	Ramsgate
1857	577	Blackman, Thomas	Woolwich
1856	449	Bloye, Henry	Holt
1856	518	Bolton, Horatio Nelson	Boston
1857	495	Boucher, John	Belper
1856	604	Bourdas, Isaiah	London
1853	209	Boyce, George	Chertsey
1853	611	Briggs, James Aston	Tipton
1855	612	Brown, William Henry	North Shields
1853	627	Buzzard, Thomas H.	Spilsby
1853	376	Chapple, Edwin	Bideford
1853	527	Chater, Edward Mitchell	Watford
1854	380	Christopher, James	Crickhowell
1851	583	Church, Henry J.	London
1857	528	Clark, John	Grantham
1860	599	Clayton, Henry	Lewisham
1853	281	Cleave, Charles T.	Chudleigh
1858	613	Colby, John	Brighton
1853	547	Cook, William	Grantham
1846	91	Copney, William	London
1854	466	Cornelius, James	Clapham
1856	617	Cornish, William	Brighton
1848	367	Cotton, John L.	Barnstaple
1853	395	Cracknell, Benjamin	Halesworth
1850	470	Cutting, James	Stowmarket

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853	590	Cutting, Thomas John	Selby
1851	351	Daines, Thomas	London
1859	552	Davies, David	Cardigan
1859	564	Delf, Frederick D.	Southampton
1859	566	Delves, George	Tunbridge Wells
1853	524	Dowse, Thomas Stretch	Bradford-on-Avon
1853	229	Duncanson, William	Glasgow
1853	368	Evans, William H.	Haverfordwest
1860	628	Edwards, William	Much Wenlock
1859	618	Elliott, Robert	Newcastle-on-Tyne
1852	462	Eyre, Joshua J.	Manchester
1856	464	Featherston, John P.	London
1853	336	Fisher, William F.	London
1856	554	Fleetwood, Thomas	Stratford-on-Avon
1860	623	Fowler, Stanley	Dover
1858	511	Francis, Thomas Harper	Dulwich
1853	614	Gething, William B.	Lincoln
1850	403	Gibbons, George	Clifton
1858	569	Giddings, William H. C.	London
1859	570	Gilbert, George Fagge	London
1858	525	Gray, Frederick	London
1856	446	Green, John	Oundle
1855	548	Green, Conrad Samuel	Stratford-on-Avon
1861	609	Gregory, George Henry	Crediton
1860	591	Grieves, Austin Stirling	Ludlow
1854	529	Griffiths, Alfred William	London
1860	624	Grindley, William	Chester
1856	438	Groves, Henry	Weymouth
1856	584	Hall, Thomas Howard	Southampton
1858	563	Hartley, William	Birmingham
1859	571	Hickman, William	Manchester
1856	574	Hill, William	Edinburgh
1854	561	Hinton, Henry Archibald	London
1860	600	Hodges, William	Ramsgate
1852	494	Humphreys, Richard	London
1853	472	Johnson, Joseph	London
1848	382	Jones, Hugh Lloyd	Chester
1853	340	Jones, William Withers	Welchpool
1856	489	Jones, Peter Cooke	London
1859	593	Jones, Robert William	Greenwich
1855	572	Keene, John	Brighton
1853	307	Kiddle, William L.	Bath
1859	629	Laurens, Frederick Lemprieré	Jersey
1856	587	Lawrence, Henry	Stratford, Essex
1857	478	Lee, John William	Liverpool
1856	300	Linford, John	Canterbury
1853	585	Long, Alfred Thorby	Brighton
1853	330	M'Intyre, Peter S.	Warkworth
1855	557	Madgwick, William Butler	Alresford
1856	451	Marks, Nelson S.	Cardiff
1853	247	Matterson, Edward H.	York
1860	615	Meadows, Henry	Gloucester
1857	512	Mee, George	Woolwich

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1842	392	Mercer, Nathan	Liverpool
1856	615	Mohun, Martin	Maidstone
1850	579	Moon, William Henry	Ilfracombe
1853	216	Morgan, William	Richmond
1852	513	Nicholson, John Joseph	Sunderland
1855	580	Norrish, James	Crediton
1857	482	Oliver, John Hamer	Salop
1857	581	Orton, Thomas J.	Nuneaton
1856	520	Owles, Edward John	Southampton
1852	530	Paine, Standen	Brighton
1853	354	Parrott, John S.	Birmingham
1853	501	Parsons, Francis H.	Southam
1857	542	Pearson, George B.	Leeds
1847	425	Peel, James	Canterbury
1853	413	Penton, Charles W.	Maidstone
1858	582	Pertwee, Frederic	London
1850	414	Player, Jacob H.	Bedford
1859	565	Powers, Edward	Stourbridge
1853	422	Preston, Richard	London
1850	108	Reeve, Edward	London
1856	439	Reynolds, Arthur	Watton
1855	440	Richards, Charles	Weymouth
1858	544	Richardson, Robert	Ipswich
1853	545	Roberts, John Albinus	Horsham
1848	250	Rolfe, William A.	Wokingham
1855	610	Sanger, William Albert	London
1853	463	Sarsfield, William	Durham
1857	616	Savage, William Wallace	Brighton
1856	452	Scholefield, Arthur	Basingstoke
1853	316	Scott, Thomas	Birmingham
1853	188	Sidley, Thomas Insall	Edinburgh
1853	277	Sirett, George B.	Buckingham
1852	207	Skrimshire, Thomas	London
1848	441	Smeeton, George H.	Leeds
1853	356	Smith, Joseph	Birmingham
1857	475	Smith, William	Glasgow
1853	349	Smith, Richard	Reigate
1842	46	Starkie, Richard S.	London
1853	509	Steevens, Joseph G.	Guildford
1859	550	Street, Edward	Salisbury
1847	33	Swann, William H.	London
1857	606	Symes, Charles	Thornbury
1855	409	Taplin, Frederick	Bristol
1860	575	Taylor, Herbert D.	Manchester
1853	221	Taylor, John N.	Lincoln
1853	320	Thompson, Henry	Leatherhead
1858	559	Thompson, Charles Henry	Huddersfield
1856	498	Tiplady, Frederick	York
1853	532	Tollinton, Richard B.	Stowmarket
1861	625	Towers, Robert	Ulverston
1856	427	Tyler, Henry Wing	Leicester
1855	594	Underdown, Frederick William	Canterbury

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1855	560	Videon, Charles	London
1853	253	Ward, Philip D.	Halifax
1851	602	Watton, Edward	Manchester
1856	596	Waugh, Alexander	Southampton
1850	607	Wells, Edwin	Ludlow
1853	456	West, Robert G.	Liverpool
1856	455	Weston, Charles	Lincoln
1857	503	Wheldon, Henry William	London
1851	114	Whitfield, Henry	Worcester
1853	423	Willett, Edmund	Brixton
1855	442	Williams, David Martin	Truro
1849	293	Williamson, David	Brighton
1854	359	Willmott, William	Bristol
1853	360	Woodcock, Joseph	Leicester
1846	223	Yates, William	Bridgnorth

ASSOCIATES OF THE SOCIETY

WHO HAVE PASSED THE MINOR EXAMINATION.

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853	704	Ambrosse, John D. L.	Putney
1853	441	Allingham, George Samuel	London
1852	161	Applegate, Edwin	Bradford
1856	424	Arnold, Spencer	Maidstone
1857	710	Baker, Thomas	Blandford
1861	711	Barnitt, John	Leeds
1850	393	Baxter, George	Chester
1856	437	Bell, William M.	Stonehouse
1857	712	Bell, James Alfred	Brighton
1857	691	Bell, William	Bedford
1859	574	Benger, Frederick Baden	Harlow
1858	535	Birrell, David	Detroit, U. S.
1861	692	Blane, Gilbert	Mauritius
1855	434	Bond, Charles Radcliffe	Ware
1859	587	Bothamley, Valentine	Newark
1861	697	Bray, John	Barnstaple
1859	601	Brett, Robert	Bath
1856	681	Brew, John A.	Brighton
1860	626	Brooks, Frederick	Tunbridge Wells
1855	461	Brown, John	London
1858	536	Brown, Charles Hills	Devonport
1861	682	Brown, Francis J.	Weston-super-Mare
1861	683	Browne, Henry R.	Deptford

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1852	178	Buchanan, James	Edinburgh
1852	179	Cameron, William	Edinburgh
1860	670	Capner, William M.	Birmingham
1860	664	Chessall, Rowland	Hoxton
1853	636	Christian, John O.	Douglas
1860	660	Churchyard, Robert L.	Bungay
1859	582	Clapham, Edward	Leeds
1860	655	Cleave, Samuel W.	Bodmin
1854	344	Clingan, William M.	Edinburgh
1853	543	Cocking, Thomas	Maldon
1848	226	Coles, Ferdinand	London
1859	661	Coles, John William	Camberwell
1856	531	Dallas, Clement	Woodbridge
1857	443	Dakin, John	Chester
1855	487	Davis, Richard	Walworth
1853	621	Dickins, Benjamin	Stratford-on-Avon
1861	693	Duffin, Thomas	Wakefield
1859	705	Ekin, Charles	Maidstone
1859	627	Evans, John James	London
1856	418	Farr, Archer	Lambeth
1859	673	Ferneley, John William	Grantham
1854	684	Fidel, Albert James	Oxford
1855	478	Fletcher, John	Camberwell
1857	492	Fowler, Charles Henry	London
1856	698	Fox, Edward M.	Falmouth
1860	617	Francis, Robert D.	Bishop's Castle
1851	622	Frost, George	Derby
1861	694	Fuller, Ira Thomas	Beccles
1861	699	Garland, Alfred P.	Hereford
1861	706	George, John E.	Newcastle Emlyn
1853	511	Gill, Levi John	Bridport
1855	405	Goddard, George	Lowestoft
1857	495	Goldfinch, George	London
1856	512	Green, James	Bath
1856	455	Grimwood, William	Ipswich
1853	341	Grundy, Thomas	London
1857	569	Haines, John Jenkins	Bromsgrove
1858	685	Hasselby, Thos. John	Goole
1855	404	Harden, Charles	Bristol
1860	623	Hardy, Samuel Croft	Birmingham
1857	471	Harrow, Henry	Tunbridge Wells
1852	600	Harvey, Sidney	London
1857	493	Hawkes, James	Birmingham
1857	658	Hill, Francis	Leeds
1860	648	Hodgkinson, Chas.	Leicester
1861	686	Holloway, Thos. H.	Sydenham
1857	597	Holmes, William C.	London
1859	649	Holmes, Edward M.	Chelsea
1859	598	Hooper, Frank	London
1858	539	Hughes, Joshua	Crickhowell
1861	707	Hughes, Roger	Chester
1858	650	Hughes, Hugh Griffith	Holyhead
1857	496	Hunneman, Charles Julius	Hanover
1847	56	Huskisson, William J.	London

Year of Admission	No. of Certificate.	NAME.	RESIDENCE.
1858	532	Ingall, Joseph	Wath-upon-Dearne
1860	629	Ismay, John George V.	Bristol
1856	666	Jackson, Warwick	Colchester
1854	479	Jefferson, Thomas	Cambridge
1855	380	Jolley, Horace	London
1861	700	Jones, Walter W.	Brecon
1853	338	Keeling, Thomas G.	Howden
1859	589	King, James	Bristol
1853	544	Laming, Welberry	Market Rasen
1854	345	Leighton, Thomas	Edinburgh
1859	708	Lescher, Frank H.	London
1855	399	Lloyd, David L.	Caernarvon
1861	701	Long, Frank	Brighton
1860	638	Marriott, Frederick T.	Rugby
1860	618	Marten, Henry Oake	Newfoundland
1847	148	Matthews, William	London
1858	533	Medwin, Aaron George	Greenwich
1859	631	Merrick, Charles James	Manchester
1856	591	Monger, Hamilton Stacey	Stroud
1858	545	Moore, Francis Samuel	Bristol
1861	687	Morgan, David	Aberayron
1860	632	Morris, Henry	Liverpool
1858	506	Muskett, Edwin Burrell	Holt
1858	502	Nesbit, John	Berwick
1855	391	Nooten, Ernest Van	Edinburgh
1851	450	Nosworthy, Robert	Exeter
1860	643	Oliver, John Gerry	Holsworthy
1858	667	Olliver, George Edward	Weymouth
1859	579	Paris, Thomas	Salisbury
1858	523	Partridge, William	Dudley
1856	452	Pearson, Edward Smith	Liverpool
1860	639	Poll, William Sheppard	Bungay
1855	611	Potts, Robert Alfred	London
1858	702	Pratt, Henry	Stratford-on-Avon
1857	713	Pritchard, George F.	Knightsbridge
1858	540	Rawling, John Wray	Wisbeach
1856	524	Rees, Thomas George	Pembroke Dock
1856	613	Reynolds, Freshfield	Guildford
1853	294	Rhind, William W.	Berwick
1853	498	Richards, Thomas Lewis	Chester
1859	703	Richardson, Robert	Dumfries
1859	659	Ridding, William	London
1856	430	Roberts, Owen	Pwllheli
1857	460	Robinson, John	Woolwich
1853	514	Robinson, William P.	Liverpool
1855	388	Routledge, Henry	London
1860	680	Sanders, Albert J.	Sandgate
1854	652	Saxby, Henry	Lewes
1857	481	Scott, Joseph Robinson	Sheffield
1857	508	Seymour, George	Oldbury
1858	578	Simpson, Henry David	Louth
1853	321	Simpson, Thomas	Walsall
1859	679	Simpson, Arthur Lankester	Stowmarket

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853	297	Simpson, Robert	Edinburgh
1860	644	Sims, Francis M. B.	Colchester
1858	509	Slack, John Lawrence	Ormskirk
1855	633	Spearing, James	Southampton
1853	268	Speechly, George	Peterborough
1852	413	Stedman, James	Lower Tooting
1853	688	Stevens, Henry Wm.	Colchester
1856	423	Stewart, James	Kirkcaldy
1853	281	Stoneham, Philip	London
1855	695	Sturton, John R.	Peterboro'
1855	383	Taplin, George	Bath
1850	326	Tasker, William	London
1854	346	Thomson, John	Edinburgh
1857	473	Tieftrunk, Julius	London
1853	333	Todd, Thomas	Edinburgh
1851	144	Towl, Edward	London
1855	466	Tuck, John	Trowbridge
1861	690	Utley, Alfred	London
1860	714	Waites, Edward W.	Ross
1849	125	Warner, John	London
1853	298	Watson, James	Montrose
1860	625	Watson, Frederick	Fakenham
1857	696	Watts, John Newton	London
1860	669	Welborne, George	Grantham
1858	553	Weller, James William	Bloxwich
1858	529	Weston, Samuel John	Leicester
1857	500	Wigg, Henry John	Lynn
1858	56€	Wilkinson, George	Manchester
1856	432	Williams, Thomas	Carmarthen
1849	94	Willmott, Edwin	London
1860	715	Wills, Douglas	Lewisham
1858	541	Wilson, Charles Wallace	London
1861	709	Winterbottom, James	Oldham
1853	572	Young, John	Musselburgh
1859	563	Young, William	Banbury
1860	634	Young, Robert Fisher	Gringley-on-the-Hill

REGISTERED APPRENTICES.

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1857	Alderson, Frederick H.	Mr. Hempsted	St. Leonards
1859	Allanson, George	Mr. Allanson	Harrogate
1860	Allen, E. Ransome	Messrs. Chapman, Bros.	Ipswich
1860	Allen, Samuel Stafford	Mr. Beale	Hemel Hempstead
1857	Allison, Richard R.	Mr. Howorth	Doncaster
1858	Allott, Frederic	Mr. Greaves	Bakewell
1853	Ambrose, John D. L.	Mr. Farmer	Putney
1859	Amoore, Alfred Stares	Messrs. Randall&Sons.	Southampton
1855	Andrews, Enos	Mr. Cropper	Long Sutton
1860	Aplin, Benj. D'Oyley	Mr. Hill	Norwood
1857	Appleton, Robert	Mr. Wilson	Sheffield
1857	Argles, Robert	Mr. Deane	Clapham
1858	Atherton, Charles Isaac	Mr. Bromley	Liverpool
1853	Atkinson, George J.	Mr. Wilson	Harrogate
1858	Atkinson, John P.	Messrs. Hurst & Morton	Louth
1856	Atkinson, Edward F.	Mr. Kirton	Hull
1858	Atwood, John Charles	Mr. Cracknell	London
1858	Backhouse, Noah	Mr. Rowntree	London
1858	Badcock, Henry	Mr. Peat	Lymington
1857	Bagshaw, James	Mr. Handley	Wakefield
1859	Bamber, John K.	Messrs. Savory & Moore	London
1853	Barber, Tom	Mr. King	Rochester
1854	Barber, William	Mr. Nunn	Bury St. Edmunds
1857	Barlow, John Podmore	Mr. Barlow	Manchester
1860	Barnett, Thos. James	Mr. Golding	London
1861	Barrett, James	Mr. Merryweather	Leicester
1851	Bartlett, Ebenezer	Mr. Mather	Reading
1856	Barton, Frederick	Mr. Wilson	Bradford
1855	Batchelor, George H. W.	Mr. Watts	Chatham
1856	Bate, Henry	Mr. Davies	Chester
1860	Battman, Thomas	Mr. Wright	Manchester
1854	Beach, Wesley	Mr. Beach	Bridport
1855	Beach, Tom Clarke	Messrs. Lea & Co.	Great Malvern
1860	Beale, Chas. George	Mr. Atkins	Salisbury
1860	Beale, Fred. Wilson	Mr. Atkins	Salisbury
1855	Beaton, Walter	Mr. Beaton	London
1861	Beattie, James	Mr. Gordelier	Sittingbourne
1860	Beattie, John	Mr. Mackay	Edinburgh
1859	Beavan, Alfred James	Mr. Matthews	London
1853	Beddard, John	Mr. Cross	Shrewsbury
1859	Bedford, Joseph	Mr. Bolton	Dover
1855	Bennington, William	Mr. Mortimer	Sidmouth
1859	Benson, James Levett	Mr. Dalwood	Sherbourne
1855	Bentley, William J.	Mr. Pryer	Axminster
1859	Berrell, Charles	Mr. Farmer	London
1854	Bingley, Frederick B.	Mr. Tanner	Exeter
1854	Bird, David L.	Mr. Wilson	Canterbury
1854	Bishop, William	Mr. Gay	Stroud
1859	Blackbourne, Henry J.	Mr. Jeffery	Horncastle
1858	Bland, Percy Owen	Mr. Fox	London

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1845	Blaxall, Arthur S.	Mr. Blanchflower	Loddon
1858	Blundell, Joseph A.	Mr. Groves	Weymouth
1859	Bolton, Edgar Benj.	Mr. Fairbank	Woolwich
1860	Bonnett, Frederick	Mr. Price	Bridgend
1859	Bourdas, John	Mr. Bourdas	London
1860	Bowen, John Thomas	Mr. Parker	Bath
1856	Bowler, Harvey F.	Mr. Hitchcock	Colchester
1860	Boyd, John	Mr. Cornish	Brighton
1854	Bradley, Edwin S.	Mr. Parker	Derby
1858	Bradley, John Perry	Mr. Parker	Birmingham
1856	Brayshay, Thomas	Mr. Brayshay	Stockton
1857	Brereton, Matthew B.	Mr. Mabson	Yarmouth
1859	Bridges, Charles Wm.	Mr. Biscoe	London
1856	Brock, George Walter	Mr. Fairbank	Woolwich
1856	Brooks, Saml. Brewer	Mr. Lawton	Wakefield
1853	Brown, Charles B.	Mr. Thorne	Bedford
1856	Brown, John	Mr. Forge	Driffield
1857	Brown, Edward	Mr. Dutton	Birkenhead
1860	Brown, James	Messrs. Gardner & Ainslie	Edinburgh
1860	Browne, James	Mr. West	Coventry
1860	Browne, Thomas L.	Mr. Higgins	Chester
1856	Browne, John Edwin	Mr. Bartlett	Chelsea
1861	Bulgin, William	Mr. Groves	Blandford
1860	Bullock, Frederick	Mr. Parkes	Manchester
1853	Burdock, James	Mr. Reading	Warwick
1860	Burlingham, Frederic	Mr. Johnson	Birmingham
1856	Burt, James	Mr. Allanson	Harrogate
1856	Burton, John	Mr. Parker	Derby
1854	Burton, Joseph	Mr. Wick	Sheffield
1858	Butler, Edward D. B.	Mr. Penney	Poole
1859	Butler, Edwin	Mr. Dowman	Southampton
1857	Campbell, Robert	Mr. Mackay	Galashiels
1859	Canning, Charles W.	Mr. Keene	Leamington
1861	Cantrell, William S.	Mr. Tylee	Bath
1858	Capern, Alfred	Mr. Anthony	Bedford
1860	Carr, John	Mr. Scarrow	Sunderland
1861	Carré, Joseph	Mr. Tylee	Bath
1857	Carré, Louis C. A.	Mr. Tylee	Bath
1855	Carrington, Ebenezer T.	Mr. Toone	Warminster
1859	Carter, Thomas	Mr. Dresser	York
1855	Cartner, David	Mr. Bell	Carlisle
1860	Carty, Michael	Mr. Radermacher	London
1854	Chambers, William	Mr. Dresser	York
1855	Chapman, Francis C.	Mr. Green	Droitwich
1855	Clarke, Willoughby	Mr. Brown	Oxford
1858	Clarkson, Sidney	Mr. Macarthy	Romford
1860	Clayton, F. C.	Messrs. Harvey & Reynolds	Leeds
1857	Cole, Alfred	Mr. Groves	Hammersmith
1858	Collier, William	Mr. Collier	Sheffield
1859	Conder, George	Mr. Smith	Walworth
1860	Cooper, Arthur Cecil	Mr. Blandford	London
1855	Cooper, Frederick	Mr. Cooper	Leicester
1859	Cooper, Henry	Mr. White	Nottingham
1861	Copland, Herbert	Mr. Anthony	Bedford
1854	Coulson, Henry	Mr. Coulson	Scarborough

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1855	Coulthard, Christopher...	Mr. Harrison	Carlisle
1858	Coward, John Senior ...	Mr. Butler	Pontefract
1854	Cozens, William	Mr. May	Reading
1854	Crease, James R.....	Mr. Mackay	Edinburgh
1853	Crussell, James W.....	Mr. Cooper.....	London
1858	Curtis, Albert Augustus	Mr. Churchouse.....	Chard
1861	Curtis, William...	Mr. Marks	Bradford-on-Avon
1860	Dale, George	Mr. Hughes	Altrincham
1861	Dale, George.....	Mr. Dale.....	Chichester
1860	Dalrymple, David H. ...	Mr. Chapman.....	Bristol
1854	Dalrymple, William.....	Mr. Luff.....	Oxford
1858	Davenport, John M. ...	Mr. Davenport	London
1857	Davies, Robert John ...	Mr. Roberts.....	London
1858	Davies, William	Mr. Coleman	Cardiff
1856	Davison, William.....	Mr. Greaves	Bakewell
1858	Dawson, James Henry...	Mr. Telfer	Oxford
1855	Dawson, John	Mr. Goddard	Yarmouth
1859	Dawson, Oliver Robert..	Mr. Smith	Southampton
1855	Dean, Samuel	Mr. Fox	London
1858	Denne, Henry	Mr. Kingdon	London
1861	Denne, John Lake.....	Mr. Buss.....	Faversham
1861	Diaper, Albert	Mr. Banfield	Bury St. Edmunds
1858	Dodshon, Edward	Mr. Dodshon	Sunderland
1857	Doughty, Edward T. ...	Mr. Doughty	London
1860	Douglas, Archibald H...	Messrs. Argles & Co.	Maidstone
1849	Dowsett, Arthur.....	Mr. Baker	Chelmsford
1856	Draper, Henry Foulger..	Mr. Arnold.....	Norwich
1858	Dumolo, John Thomas..	Mr. Parker	Birmingham
1861	Dyson, Walter	Mr. Taylor.....	Pendleton
1853	Earland, William.....	Mr. Davies	Hay
1859	Earnshaw, Benj. King...	Messrs. Garratt	Rugby
1856	Eason, John	Mr. Gilkes	Leominster
1858	Eastman, Jabez.....	Mr. Clark	Hackney
1861	Edwards, Chas. R.....	Mr. Gunn	Harrow
1857	Edwards, Frederick H...	Mr. Medcalf	Lower Tooting
1854	Eland, Edward F.	Mr. Telfer	Oxford
1853	Elliott, Robert John.... .	Mr. Steward	Yarmouth
1859	Ellis, Henry Brook	Mr. Collins.....	Bristol
1856	Eminson, John	Mr. Marshall	Gainsborough
1860	Epps, Franklin	Mr. Epps	London
1853	Evans, William.....	Mr. Ferris	Bristol
1857	Evans, Alfred Paget ...	Mr. Cutting	Leamington
1853	Evans, Edward.....	Mr. Bancroft	Ruthin
1857	Eve, Charles.....	Mr. Wilson.....	Holloway
1854	Fairley, Robert.....	Mr. Mackay	Edinburgh
1860	Fancourt, John.....	Mr. Lavers.....	Blackheath
1856	Farrar, William	Mr. Heming	Sunderland
1861	Finch, Thos.	Mr. Aitken	Edinburgh
1861	Fitt, Fras. Ed.	Mr. Fitt	Barking
1857	Foggitt, Thomas	Mr. Smeeton	Leeds
1852	Foster, Michael E.	Mr. Sturton	Peterborough
1854	Foster, Thomas U.	Mr. Weston	Sleaford
1858	Fuller, Thomas G.....	Mr. Fuller.....	Burntisland, N.B.
1857	Gibbs, Thomas.....	Mr. Steward	Yarmouth
1851	Gilliatt, William	Mr. Gamble	Grantham

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1859	Gillies, Wm. Jonathan...	Mr. Dunn	St. Austell
1855	Goodchild, Nathaniel ...	Mr. Wood	Brighton
1859	Goodwin, Medmer	Mr. Telfer.....	Oxford
1855	Goodwyn, Charles S.....	Mr. Chapman	Ipswich
1860	Gray, Thomas	Mr. Banks	Birmingham
1861	Greatrex, Thomas Jas...	Mr. Andrews	London
1859	Greaves, Wm. Samuel ...	Mr. Greaves	Ironville
1860	Green, Edwin G.	Mr. Greaves	Bakewell
1855	Gregory, Richard.....	Mr. Lavers	London
1858	Greig, Francis	Mr. Mackay	Edinburgh
1861	Griffith, William H.....	Messrs. Ferris.....	Bristol
1855	Grigor, William	Mr. Macfarlan.....	Edinburgh
1853	Gunn, Frederick T.	Mr. Cross	Shrewsbury
1860	Haddock, George J.....	Mr. Thompson	Norwich
1859	Hadley, Thomas	Mr. Harris	Hereford
1856	Halsey, Bennet	Mr. Husband.....	Exeter
1854	Ham, Charles	Mr. Foster	Collumpton
1860	Hamilton, Herbert B. ...	Mr. Savage.....	Brighton
1860	Harland, Richard Thos ..	Mr. Dresser	York
1854	Harley, Edward	Mr. Foster	Ludlow
1860	Harper, George.....	Mr. Deck	Cambridge
1858	Harper, Wm. James. ...	Mr. Gent	Macclesfield
1860	Harris, Henry Wm...	Messrs. Ford & Miller...	Reading
1856	Harrison, Stephen	Mr. Breary.....	Douglas
1853	Haslam, Frederick B. ...	Mr. Dakin	Poplar
1856	Hatch, Richard M.	Mr. James	Bognor
1857	Hatchard, Stephen	Mr. Huggins	Alresford
1859	Hatchett, Thomas	Mr. Hemingway.....	London
1856	Head, John T.	Mr. Head	Lewes
1857	Heald, Alfred John.....	Mr. Barley	Wisbeach
1859	Hickman, William	Messrs. Argles & Co.	Maidstone
1857	Highway, Matthew H....	Mr. Caddick	Newcastle-u.-Lyne
1843	Hill, William.....	Mr. Rowe	Plymouth
1857	Hoare, James Raper ...	Mr. Gigner.....	Chelsea
1852	Hodgkinson, John S. ...	Mr. Brooker	Macclesfield
1859	Holgate, Walter	Mr. Barber.....	Liverpool
1856	Holland, William.....	Mr. Sibary	Longton
1852	Holliday, Joseph	Mr. Wilding	Liverpool
1859	Holmes, John Thomas...	Mr. Botham.....	Manchester
1855	Holmwood, William C...	Mr. Coppock	Bridport
1855	Holt, George F. W. ...	Mr. Obbinson.....	Sleaford
1856	Holt, William Henry ...	Mr. Paulden	Altrincham
1861	Hooper, Leonard	Mr. Hooper	London
1858	Hopgood, Rich. Cooper..	Mr. Hopgood.....	Chipping Norton
1854	Horn, William	Mr. Longrigg...	Appleby
1860	Hoskyn, Montague J. ...	Mr. Pearce.....	Southampton
1859	Hudson, John William...	Mr. Pratt	Bradford
1859	Hughes, Thomas Jones..	Mr. Hughes	Holyhead
1854	Humphries, Henry A....	Mr. Grounds	Ludlow
1852	Hunter, George	Mr. Garbutt	Gateshead
1857	Iliffe, Frank	Mr. Brown	Coventry
1843	Ince, Joseph.....	Mr. Ince.....	London
1859	Isherwood, James	Mr. Greenwell.....	London
1858	Ive, William	Mr. Lawrence	Kensington

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1856	Jackson, John	Messrs. Wilson & Co.	Bradford
1855	Jakins, George S.	Mr. Golding	London
1860	Jelly, Stephen J.	Mr. Simpson	Hull
1859	Jones, Jas. Davenport	Mr. Marston	Ludlow
1859	Jones, John Reed	Messrs. Garratt	Rugby
1860	Jones, Hugh	Mr. Bancroft	Ruthin
1861	Jones, Richard Edward	Mr. Jones	Carmarthen
1860	Judson, Charles W.	Mr. Judson	Ripon
1856	Kemp, Francis	Mr. Smeeton	Leeds
1851	Kent, William Henry	Mr. Buck	Colchester
1860	King, James Hurman	Mr. Stroud	Bristol
1861	Kite, John C.	Mr. King	Rochester
1861	Knight, Benjamin	Mr. Maggs	Yeovil
1854	Knight, John A.	Mr. Arnold	Norwich
1858	Knowles, John Hiles	Mr. Anthony	Bedford
1860	Lacey, Richard	Mr. Arnold	Norwich
1857	Lacey, Walter	Mr. Meredith	Bristol
1855	Lamplough, John	Mr. Stevenson	Derby
1857	Langley, William	Mr. Tylee	Bath
1861	Lasham, John William	Mr. Kendall	Stratford-on-Avon
1857	Lavers, Thomas F.	Mr. Lavers	Lewisham
1853	Lawrence, George	Mr. Wright	London
1853	Le Feuvre, Francis	Mr. Ereaut	Jersey
1858	Leppard, James	Mr. Williams	Horsham
1851	Lees, James	Mr. Clarke	Richmond
1860	Llewellyn, Peter	Mr. Phillips	Carmarthen
1859	Lightfoot, John	Mr. Shepheard	Chester
1860	Lindley, Wm. Walker	Mr. Evans	Swansea
1860	Livermore, George	Mr. Goodger	London
1859	Lock, Edward	Mr. Haydon	Fordingbridge
1857	Lovatt, John Hammond	Mr. Wilshaw	Wordsley
1859	Lucas, Philip John	Mr. Martin	Guildford
1861	Ludgater, Alfred	Mr. Gordelier	Sittingbourne
1857	Machon, Edward	Mr. Parkes	Manchester
1858	MacGeorge, William	Mr. Carruthers	Dumfries
1860	Maine, Philip B.	Mr. Wills	Barnstaple
1855	Malin, Edmund C. M.	Mr. Huggins	Barnet
1859	Manby, Thomas	Mr. Chenery	Ipswich
1847	Marrack, George M.	Mr. Searle	Crediton
1852	Marrack, Philip	Mr. Searle	Crediton
1856	Martin, James	Mr. Palk	Southampton
1857	Martin, Benjamin	Mr. Handley	Wakefield
1859	Martin, Frederic	Mr. Candler	Margate
1860	Martindale, William	Mr. Thompson	Carlisle
1857	Mason, John	Mr. Mason	Hastings
1857	Mathias, Thomas	Mr. Jones	Narberth
1853	Matthews, Charles	Mr. Gostling	Diss
1860	Matthews, Frederick W.	Mr. Baker	Islington
1858	Maudson, Joseph W.	Mr. Maunder	Sheffield
1855	May, Augustus S.	Mr. Greenwell	London
1855	McCabe, Dunbar	Mr. Macfarlan	Edinburgh
1859	Metcalfe, Chas. J.	Mr. Maitland	London
1857	Midgley, John James	Mr. Reinhardt	Hull
1858	Midgley, Charles	Mr. Rimmington	Bradford, York

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1858	Midgley, J. E.	Messrs. Lynch & Wilkinson.	Manchester
1856	Miller, Duncan S.	Mr. Pooley	Bath
1859	Miller, Thomas Henry	Mr. Jackson	Crediton
1858	Monkhouse, Joshua	Mr. Davies	Gainsborough
1857	Moore, Abraham	Mr. White	Birmingham
1856	Morley, Edward	Mr. Asling	Spalding
1856	Morley, George	Mr. Wheeler	Hackney
1860	Morris, William	Mr. Hardman	Kirkham
1859	Moysey, William	Mr. Moon	Ilfracombe
1853	Moverley, Robert	Mr. Dingley	Maidstone
1857	Murrell, John Friday	Mr. Maynard	Brandon
1856	Newby, John	Mr. Hughes	Altrincham
1860	Norrish, Henry	Mr. Jackson	Crediton
1861	Oldfield, Francis	Mr. Bolton	Dover
1859	Oliver, Robt. Dawson	Mr. Smith	Southampton
1847	Orpe, Thomas M.	Mr. Watton	Derby
1849	Ough, William	Mr. Jeffery	Devonport
1856	Overton, William	Mr. Fowke	Stafford
1852	Owles, James John	Mr. Owles	Yarmouth
1860	Parkes, Robert	Mr. Townsend	Burton-upon-Trent
1858	Parry, William	Mr. Christopher	Crickhowell
1859	Pasmore, Fred. Rich.	Mr. Pasmore	Chelsea
1859	Payne, Sidney	Mr. Kendall	Stratford-on-Avon
1858	Pearcey, Herbert A.	Mr. Biggs	London
1860	Pearson, Henry J.	Mr. Hurst	Louth
1858	Phillips, Jonathan	Mr. Christian	Godalming
1859	Philpot, Arthur Walter	Mr. Wimble ..	Maidstone
1858	Pickup, Robt. Lansdale.	Mr. Pickup	Manchester
1859	Picton, John T.	Messrs. Picton & Hatton	Warrington
1858	Pissey, William F.	Mr. Pissey	Rayleigh
1857	Pistrucci, Filippo	Mr. King	London
1855	Pitman, John	Mr. Fendick	Bristol
1859	Postans, Arthur Wm.	Mr. Banfield	Bury St. Edmunds
1854	Power, Thomas M.	Mr. Williams	Nottingham
1859	Pratt, Albert Edward	Mr. Smith	Bury St. Edmunds
1860	Pratt, Joseph	Mr. Loggin	Stratford-on-Avon
1860	Preston, Joseph C.	Messrs. Preston	London
1857	Price, Thomas	Mr. Laen	Pembroke Dock
1860	Provost, John Arthur	Mr. Chaston	Lowestoft
1857	Prust, Richard	Mr. Brend	Swansea
1858	Pryce, Alfred C.	Messrs. Picton & Hatton	Warrington
1858	Pullin, William H.	Mr. Parkes	Atherstone
1853	Quinlan, Joseph	Mr. Times	London
1855	Rae, John Inglis	Mr. Mackay	Edinburgh
1858	Rainnie, Alexander	Mr. Stewart	Edinburgh
1859	Rastrick, Robert Joseph.	Mr. Rastrick	Southsea
1858	Rayner, Gilmour G.	Mr. Brend	Swansea
1856	Rea, James Parker	Mr. Rea	London
1857	Reed, Alfred	Mr. Gordelier	Sittingbourne
1860	Richardson, Joseph H.	Messrs. Balkwill & Sons	Plymouth
1860	Rider, Frederick	Mr. Tippett	London
1852	Riley, James	Mr. Smith	Sutton Coldfield
1858	Ritchie, John Moffat	Mr. Medley	Derby
1852	Rivers, Henry	Mr. Hornsby	Odiham

Date of Registration	NAME.	RESIDING WITH.	TOWN.
1856	Roberts, John L.	Mr. Sibary	Longton
1859	Roberts, Charles	Mr. Handley	Wakefield
1860	Roberts, Thos. E.	Mr. Jones	Rhyl
1859	Robertson, A. G.	Messrs. Macfarlan & Co.	Edinburgh
1857	Robinson, James F.	Messrs. Picton & Hatton	Warrington
1859	Rochford, Percy	Mr. Burden	London
1858	Romans, Thomas	Mr. Cutting	Selby
1860	Rose, Alfred	Mr. Dakin	London
1856	Rosselloty, John C.	Mr. Couch	Islington
1857	Rowell, Joseph	Messrs. Sturton & Son	Peterborough
1853	Salmon, Henry L.	Mr. Moore	Brighton
1860	Saul, William Benjamin.	Mr. Pring	Taunton
1860	Saul, William W.	Mr. Prior	Oxford
1859	Savage, George Henry	Mr. Savage	Brighton
1846	Savory, Thomas H.	Mr. Savory	London
1846	Savory, Charles H.	Mr. Savory	London
1860	Saxby, Robert	Mr. Saxby	Lewes
1857	Scott, James Furness	Mr. Smith	Dunstable
1859	Scruby, William Yull	Mr. Pertwee	Romford
1857	Seaton, Charles A.	Mr. Hill	Sherborne
1861	Severs, Joseph	Messrs. Harvey & Reynolds	Leeds
1859	Shadford, Thomas	Mr. Shadford	Spalding
1855	Shaw, Ward	Mr. Lofthouse	Hull
1858	Shaw, Benjamin	Mr. Gissing	Wakefield
1860	Shephard, T. F.	Messrs. Schweitzer & Co.	Brighton
1845	Shepheard, Thomas	Mr. Gulliver	Lutterworth
1854	Shepley, Samuel	Mr. Claughton	Chesterfield
1857	Sheriff, Thomas	Mr. Macfarlan	Edinburgh
1855	Simpson, Thomas	Mr. Allen	Boston
1854	Slater, Henry	Mr. Asling	Spalding
1856	Slator, Thomas	Mr. Pilley	Boston
1856	Smart, Benjamin	Messrs. Lea and Co.	Worcester
1852	Smith, Edward	Mr. Lynch	Manchester
1852	Smith, William	Mr. Sumner	Birmingham
1853	Smith, Frank de Carle	Mr. Wright	London
1854	Smith, Frederick	Mr. Foster	Ludlow
1844	Smith, James W.	Mr. Coulson	Scarborough
1859	Smith, George Henry	Mr. Tonge	York
1859	Smith, Hubert	Mr. Luff	Oxford
1860	Smith, Thomas Hoskins.	Mr. Rook	Sittingbourne
1860	Smith, Herbert Geo.	Mr. Witherington	Worcester
1860	Smith, Rawson	Mr. Davis	High Harrogate
1859	Smyth, Samuel Walton.	Mr. Sims	Barnsbury
1858	Soole, Seymour Henry	Mr. Jessopp	Bishop Stortford
1860	Sproat, Robert	Mr. Parker	Derby
1860	Squire, Frank R.	Mr. Asling	Spalding
1858	Stanley, Robert Swan	Mr. Wortley	Durham
1854	Stanway, William H.	Mr. Blandford	London
1857	Stapleton, Thos. Glode.	Mr. Collins	London
1856	Stokes, Edward H.	Messrs. Lea and Co.	Malvern
1859	Stokes, Walter Edw.	Mr. Boully	London
1857	Stone, George	Mr. Tonge	York
1858	Stretton, Charles	Mr. Parker	Derby
1853	Sturges, William T.	Mr. Gudgen	Kimbolton

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1860	Sumner, Chas.	Mr. Hill	Sheffield
1857	Syer, John Witham	Mr. King	Soham
1859	Sutcliffe, J. Clarkson	Mr. Strachan	Barnsley
1856	Tanner, Augustus F.	Mr. Dickinson	London
1857	Taylor, George Spratt	Mr. Coupland	Harrogate
1855	Teed, David	Mr. Pasmore	Exeter
1854	Thomas, George S.	Mr. Outhwaite	Bradford
1861	Thomas, John Ashlin	Mr. Coupland	Harrogate
1856	Thomson, Denzil	Mr. Witherington	Worcester
1858	Thomson, George G.	Messrs. Macfarlan	Edinburgh
1858	Tilden, William A.	Mr. Allchin	London
1858	Tolbert, Thos. W. H.	Mr. Froud	Dorchester
1860	Topliss, Richard	Mr. Breary	Douglas
1857	Touzeau, James Fred.	Mr. Arnold	Guernsey
1857	Touzeau, John Arnold	Mr. Arnold	Guernsey
1856	Towerzey, Alfred G.	Mr. Towerzey	London
1857	Trewavas, Richard J.	Mr. Job	Truro
1860	Trollop, William	Mr. Steward	Yarmouth
1856	Trotter, Joseph	Mr. Brown	York
1857	Truman, George F.	Mr. Wellington	Oakham
1853	Turner, John	Mr. Payne	Aylesbury
1856	Twinberrow, James K.	Mr. Twinberrow	London
1858	Umney, Charles	Mr. Corrie	Bedford
1859	Vacher, A.	Messrs. Bullock & Reynolds	London
1855	Vooght, William	Mr. Twinberrow	London
1846	Wakefield, Cecil H.	Messrs. Lea & Co	Worcester
1861	Walker, Alfred	Messrs. Durant	Dorking
1849	Walker, Charles	Mr. Walker	Hogsthorpe
1854	Walker, Joseph	Mr. Witherington	Worcester
1857	Walker, George	Mr. Goodall	Derby
1859	Walker, William H.	Mr. Headley	Bridlington Quay
1857	Wall, John Thomas	Mr. Butcher	Cheltenham
1853	Walls, Thomas	Mr. Barber	Liverpool
1855	Walton, Ralph	Mr. Ritson	Sunderland
1860	Ward, Joseph	Mr. Iliffe	Nuneaton
1859	Warland, Francis W.	Mr. Penney	Poole
1857	Warren, Thomas P. B.	Mr. Pasmore	Exeter
1860	Warren, George Robert.	Mr. Harris	Ware
1858	Waters, Alexander	Mr. Corrie	Bedford
1860	Watkins, Richard	Mr. Fowler	London
1857	Watson, Richard T.	Mr. Dobinson	Bishopwearmouth
1857	Watson, Thomas D.	Messrs. Martindale & Son	Carlisle
1861	Watts, Charles C.	Mr. Clarke	Richmond, S.W.
1860	Watts, John	Mr. Fincham	London
1859	Wearing, R. Hodgson	Mr. Wearing	Liverpool
1857	Webber, Charles F.	Mr. Edwards	Sidmouth
1859	Webster, George O	Mr. Seddon	Manchester
1858	Webster, George W.	Mr. Webster	Warrington
1861	Welch, Thos. Kemp	Messrs. Randall & Son	Southampton
1853	Wheeler, James	Mr. Payne	Aylesbury
1855	Wheeler, Joseph W.	Mr. Owen	London
1856	White, John G.	Mr. Ransome	Hitchin
1856	White, James W.	Mr. Iverach	Kirkwall
1859	White, Alfred	Mr. Mount	Canterbury

Date of Registration.	NAME.	RESIDING WITH	TOWN.
1861	White, William	Mr. Bottle	Dover
1856	Whitehouse, George H.	Mr. Tonge	York
1857	Wigginton, Joseph	Mr. White	Nottingham
1858	Willan, James R.	Mr. Pratt	Wolverhampton
1860	Williams, Robt. H.	Mr. Jones	Rhyl
1850	Willcox, John W.	Mr. Hollier	Dudley
1860	Williams, W. P.	Messrs. Williams & Fitzhugh.	Nottingham
1856	Willsher, Stephen Henry.	Mr. Bolton	Tenterden
1852	Wilson, William	Mr. Rainey	Spilsby
1859	Wilson, Francis	Mr. Lord	Rochdale
1861	Wilson, Thomas.	Messrs. Sutton & Cornell.	Stowmarket
1860	Wilson, William	Mr. Griffith	Slough
1856	Witherington, Henry	Mr. Witherington	Worcester
1853	Wood, Edmund	Mr. Pooley	Bath
1854	Wood, John Robert	Mr. Simmonds	Boston
1857	Wood, Albert	Mr. Watkins	Walsall
1861	Woodcock, James	Mr. Cutting	Leamington
1858	Wootton, Alfred C.	Mr. Wootton	Luton
1858	Wyman, John	Mr. Gulliver	Lutterworth
1855	Yerworth, Edmund	Mr. Binge	Pimlico
1857	Young, John	Mr. Mackay	Galashiels

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

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THE JACOB BELL MEMORIAL SCHOLARSHIPS.

We have much pleasure in directing the attention of our readers to the announcement which appears in another part of this Journal, that Two Scholarships, established as a memorial of the late Jacob Bell, are now offered for competition to students of the Pharmaceutical Society.

The proposition for founding these Scholarships was made immediately after the death of the late Jacob Bell. It emanated simultaneously from several sources, but was carried into effect through a resolution of the Council of the Pharmaceutical Society—

"That a Committee be appointed to take the requisite steps for forming a Capital Fund, out of which one or more Scholarships, bearing the name of Jacob Bell, may be established, in connexion with the Society."

It was afterwards resolved by the Council, at a special meeting held on the 20th of July, 1859, that there should, if possible, be two or more scholarships founded, to be in the gift of the Council of the Pharmaceutical Society for the time being; that one or more of these scholarships be open to Registered Apprentices and Associates of the Society who are under twenty-one years of age, and who shall be considered to have established their claim thereto by capability, industry, and general good conduct; and that in addition to these, there be others of a higher grade to be offered, with the view of encouraging the further prosecution of scientific study, to Associates under twenty-four years of age, who have passed the Major Examination.

The fund was raised for the special purpose of carrying out these resolutions, and the amount collected having been invested in the names of Messrs. Hanbury, Hills, and Waugh, as trustees, it has been further resolved by the Council, with the view of bringing the scholarships into immediate operation—

"1. That each Scholarship be of the annual value of thirty pounds, and be held for one year, but that the Council have the power of extending the term to a second year if the scholar shall have given proof of such an amount of talent and perseverance as will warrant the further grant.

"2. That the Laboratory of the Pharmaceutical Society be the school in which the holders of the scholarships shall pursue their studies; but if at any future time that school be discontinued, then some other shall be selected by the Council for the time being.

"3. That the payment on account of each scholarship be divided into two moieties, the first to be paid on entry into the school, and the second at the expiration of five months, but that the Council have the power of withholding the second payment if misconduct or want of diligence be proved against the scholar."

It is proposed that the first appointments to these scholarships shall be made at the opening of the school in October next, for the ensuing session. Candidates are to make written application to the Secretary before the 15th of September, and they will have subsequently to present themselves before the Board of Examiners, by whom their qualifications will be tested. Founded upon the report of this examination, together with other evidence which may be adduced, the Council will make a selection of those they consider most deserving.

These appointments will be valuable aids to meritorious students, to assist them in pursuing their scientific studies, and we trust they will also serve to stimulate our Registered Apprentices and Associates generally to a diligent attention to all the duties which devolve upon them, with a view to their becoming successful candidates for the Jacob Bell Memorial Scholarships.

PROGRESSION AND THE BYE-LAWS.

The correspondence on this subject, a continuation of which is published in our present number, proves that opinions differ very widely with reference to the expediency of altering, as proposed, the existing regulations for the admission into the Society of Chemists who were in business prior to the passing of the Pharmacy Act. The Committee to whom the consideration of the subject was referred by the Council, have concluded to suspend their decision until further opportunity has been afforded to Members of the Society throughout the country to collect the data required, and to express their opinions on the point in question. If the very strong feeling of objection to the proposed change which has been manifested by several members should be found to be participated in to any extent by others, and to be unremoved by further consideration and the statements made in favour of the change, it is not, we think, probable that the Council, whatever their individual opinions may be, would consider it wise to proceed even to submit the question for decision by the majority. If carried, it should be with the unanimous, or almost unanimous, assent of the whole body.

We must again impress upon our readers the fact, of which several correspondents appear to lose sight, that the Council are merely considering how far it may be expedient to make the proposed alteration, and Members would contribute very considerably to the satisfactory settlement of the question by supplying information of the number of well-qualified Chemists who were established in business before the passing of the Pharmacy Act, and who would now be willing to join the Society on the terms stated in the last number of this Journal.

THE PREVENTION OF ACCIDENTAL POISONING.

It will be seen, on referring to the Transactions of the Society, that a Committee of the Council has been appointed to consider the best arrangements to be adopted for the protection of the public against accidental poisoning. It is obviously the duty, and it is no less the interest, of those engaged in the sale of poisonous substances, to adopt the most efficient means of protecting the public from danger in their use. If it could be shown to the general satisfaction of practical men that any proposed arrangement would be more efficient than the means already in use, its adoption would follow as a certain result, for the motives in this direction are far more powerful than any that could operate the other way. The only question, therefore, is, What are the best arrangements to adopt? Several suggestions have recently been made, with reference to which much difference of opinion exists. It will be the object of the Committee, if possible, to propose such practically available means for lessening danger as shall meet the assent of all those engaged in the sale of poisons, and they hope to be assisted in this object by Members throughout the country who have suggestions to offer.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *3rd July*, 1861,

Present—Messrs. Bird, Bottle, Bucklee, Deane, Edwards, Evans, Hanbury, Haselden, Hills, Meggeson, Morson, Sandford, Savage, Squire, and Waugh, the following were elected

MEMBERS.

CHELMSFORD .....Baker, Garrad
HEREFORD .....Hustwick, Thomas H.
NORWICH .....Skrimshire, Thomas

MAJOR EXAMINATION, 16*th July*, 1861.

Browne, Henry Robert .....Deptford
Garland, Alfred Philip.....Hereford
Hasselby, Thomas John .....Gorle
Holloway, Thomas Henry .....Sydenham
Hughes, Roger.....Chester
Jones, Walter William.....Brecon
Morris, Henry .....Liverpool
Olliver, George Edward .....Weymouth
Saxby, Henry .....Lewes
Simpson, Arthur Lankester.....Stowmarket

MINOR EXAMINATION.

James, John .....Swaffham
Jones, John Edward.....Cardigan
Strawson, George Frederick .....Crewkerne
Wilson, Walter William .....Birmingham

REGISTERED APPRENTICES.

NAME.	RESIDING WITH.	ADDRESS.
Bateman, Thomas Henry....	Mr. Tabor.....	Salisbury
Davies, Francis Pritchard...	Messrs. Southall & Co.	Birmingham
Jordan, Edmund Henry.....	Mr. Chubb.....	London
Kinch, Charles James.....	Mrs. Kinch	Henley-on-Thames

THE JACOB BELL MEMORIAL SCHOLARSHIPS.

THE Council having received and adopted the report of a Committee relating to the arrangements for bringing the Jacob Bell Memorial Scholarships into immediate operation,

It was resolved, that notice be given to the following effect :—

The Council will be prepared to receive applications for, and to award, two scholarships (a senior and a junior scholarship), to come into operation at the commencement of the ensuing Session in October next. Candidates for these scholarships must be Associates, Apprentices, or Students, on the Register of the Pharmaceutical Society.

The senior scholarship is to be given to Associates under twenty-four years of age, who have passed the Major Examination.

The junior scholarship is to be given to Apprentices or Students under twenty-one years of age.

The Laboratory of the Pharmaceutical Society is the school in which the holders of the scholarships shall pursue their studies.

Each scholarship is of the annual value of thirty pounds, and is to be held for one year. The payment will be made in two moieties, the first to be paid when the scholar enters upon his studies in the school, and the second at the expiration of five months.

Competitors for these scholarships will be required to present themselves for examination before the Board of Examiners, on a day of which notice will be given them, for the purpose of testing their proficiency in general education, including the knowledge of the Latin language, English composition, arithmetic, chemistry, botany, and materia medica; and they will also be expected to produce satisfactory testimonials of character from their previous employers or masters.

Candidates are requested to give notice to the Secretary of the Society, at 17, Bloomsbury Square, on or before the 15th of September.

APPOINTMENT OF LOCAL SECRETARIES.

The subject of the appointment of Local Secretaries having been brought under the consideration of the Council,

It was resolved—

1. That in the opinion of this Council it is desirable that the election of Local Secretaries should be vested in the hands of local Members, subject to the approval of the Council.

2. That, in accordance with this view, the present Local Secretaries in connexion with the Pharmaceutical Society will bear in mind that their term of office expires simultaneously with the Members of the Council in May, 1862, and thence after that they shall be elected annually in their respective localities by the local Members, summoned by the outgoing Secretary for that purpose; but should there be, from any cause, an omission to fill up the appointment, it shall be expedient, at the suggestion of a local Member, with the consent of the Council, to take the necessary steps to supply the omission; and that this notice be inserted in the Transactions of the Society in the August number of the Journal.

PROTECTION AGAINST ACCIDENTAL POISONING.

It was resolved—

That a Committee be appointed, of the following gentlemen, to inquire into, and report to the Council upon, the best arrangements, if any, to be adopted for the protection of the public against accidental poisoning:—

The President, Vice-President, Messrs. Morson, Deane, Waugh, Hills, Haselden, Bucklee, Bird.

That the above resolution be published in the Transactions of the Society, with a view to elicit suggestions from our Members throughout the country.

THE PROPOSED ALTERATION OF THE BYE-LAWS.

At a Meeting of Committee, held on the 26th of July, the following minute was adopted:—

"The Committee having considered the bye-laws, and the correspondence relating to proposed alterations of the same, think it desirable to have a further expression of opinion on the subject before proceeding with that part of the proposed alteration relating to the admission to Membership of Chemists in business on their own account prior to 1852, without passing the usual examination, but on the production of certificates satisfactory to the Council."

PROVINCIAL TRANSACTIONS.

BRIGHTON CHEMISTS' ASSOCIATION.

The Brighton Chemists' Association held their first quarterly meeting (by the kind permission of the Committee) in the large room of the Lying-in Institution, West Street, on the 28th of June. The President, T. A. Brew, Esq., delivered the inaugural address, and after other matters of business connected with the Association had been disposed of, a sub-committee was formed, consisting of Messrs. Cornish, Noakes, and Savage, to prepare rules and make regulations for a Library, towards which the Hon. Sec., Mr. Gwatkin, most liberally offered to contribute twenty volumes of the *Pharmaceutical Journal*, bound, with six other valuable works. The same committee, with the addition of Messrs. Breton and Colby, jun., were empowered to make the necessary arrangements for the annual excursion in the country. After tea and coffee there was a good exhibition of first-class microscopes belonging to Messrs. Gwatkin, Savage, and Wood; also a large stereoscope, which shows six dozen slides without removal. Mr. Noakes exhibited an electrical apparatus, consisting of a metallic disc attached to a wire, and suspended by silk between two voltaic columns. This disc has been continually moving from one column to the other without any attention for a great number of years. Some fine photographs were placed on the tables by Mr. Cornish; also chemical, geological, botanical, and pharmaceutical specimens, by the President, Messrs. Gwatkin, Breton, and Schweitzer, who also produced some raw silk and other material, made up by a unique machine, so small that it could be held in a hat.

ORIGINAL AND EXTRACTED ARTICLES.

ON THE ADULTERATION OF BLACK HELLEBORE (*HELLEBORUS NIGER*) WITH BANE-BERRY (*ACTÆA SPICATA*).

BY ROBERT BENTLEY, M.R.C.S. ENG., F.L.S.,

Professor of Materia Medica and Botany to the Pharmaceutical Society of Great Britain.

In a paper of mine which was recently published in the *Pharmaceutical Journal*,* on "Actæa, or Cimicifuga racemosa," I briefly alluded to the substitution or intermixture of Bane-berry rhizomes with those of Black Hellebore, and expressed my belief that such a substitution or intermixture was by no means uncommon in this country. Since that time I have noticed it so frequently, that I have thought it desirable to place the matter more fully before the Pharmaceutist in a separate communication; and I am more particularly induced to do so, as I have reason to believe, that Black Hellebore is employed more frequently in this and other countries than is commonly supposed, and also, from the circumstance of my having only alluded to the subject in a paper professedly on a different substance, this adulteration has doubtless, in some degree at least, been overlooked.

Both the *Helleborus niger* and *Actæa spicata* belong to the same Natural Order, Ranunculaceæ; but their properties are very different. Thus, the *former* has been known for ages as a drastic purgative; (indeed, it is interesting to note here, that the use of Hellebore as a purgative dates as far back as 1400 years before Christ, and is the earliest instance on record of the employment of a purgative); while the *latter* has no such action upon the animal system, but, on the contrary, possesses astringent, combined with antispasmodic and expectorant properties, and would probably be found serviceable in acute rheumatism, chorea, and the other diseases in which the *Actæa racemosa* has been found so efficacious, as in its chemical and general characteristics it closely

* Vol. ii., Second Series, page 460.

resembles that substance.* The substitution of the latter for the former, or its intermixture with it in any degree, should be carefully looked for and guarded against; for it is by no means improbable, that the uncertain action now commonly noticed of the once celebrated purgative, *black hellebore,* is due, in some degree at least, to bane-berry rhizome being frequently mixed with, or altogether substituted for it. It may be observed, however, that the Hellebore of the ancients was not derived from *Helleborus niger,* but from *Helleborus officinalis.* This is a matter, however, of but little importance, as both these species, as well as those of our native *H. viridis* and *fœtidus*, exert a similar action on animals, and have been even considered by some to be more active than the former.

Actæa spicata is occasionally found wild in this country, more especially in bushy places in limestone tracts in Yorkshire, near Halifax, and is tolerably abundant on the continent of Europe, and, hence, a ready explanation of the cause of the substitution, or intermixture of its rhizomes with those of *Helleborus niger,* which is also found there.

The substitution, or intermixture of bane-berry rhizomes and radicles with those of black hellebore has been frequently noticed on the continent of Europe† and in America.‡ Dr. Carson has particularly described this adulteration in the *American Journal of Pharmacy,*§ but I have not seen his paper upon the subject. On this account, the rhizome of *Actæa spicata* has been sometimes termed *radix hellebori nigri falsi.*

Guibourt‖ has also described a *false black hellebore,* which resembled the rhizome of *Actæa spicata* in colour and texture, but differed from it in its odour and taste, in which latter particulars it resembled black hellebore. This false hellebore, which came from the South, he believed to be derived from *Helleborus fœtidus*, and he attributed the different appearances which this rhizome obtained from the Alps of Savoy presented, to that which it ordinarily presents when derived from the same plant found growing further North, to the different conditions of climate, &c., to which it had been exposed. It would appear from Guibourt's remarks, although he has given no positive opinion upon the subject, that he thinks the *false black hellebore* described by writers on materia medica, is not derived from *Actæa spicata* at all, but from *Helleborus fœtidus.* With respect to the particular specimen of *false black hellebore*, described by Guibourt, I cannot doubt but that so good an observer was perfectly correct; but that the rhizome of *Actæa spicata*, or an allied species, is one of the *false black hellebores* of England I am perfectly certain, as it is essentially different in its structure and chemical characteristics from that derived both from *Helleborus niger* and *H. fœtidus.* This false hellebore is also so like the rhizome of *Actæa racemosa*¶ that there can be no doubt but that it is derived from an allied species. I have also compared it with authenticated specimens of the rhizomes of *Actæa spicata* derived from the Royal Botanic Society's Gardens, and found that in appearance, structure, and chemical reactions the two were almost identical. It is possible, indeed, that this false black hellebore may be derived from a species of Actæa allied to *A. spicata*, but this is scarcely probable, as *A. spicata* is the only European species.

The substitution, or intermixture, of bane-berry rhizome with black hellebore had not been specially noticed in this country before I called attention to it in

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* See *Pharm. Journ.*, vol. ii., Second Series, page 464.

† Murray's *Apparatus Medicaminum*, vol. iii., page 48; and Pereira's *Materia Medica*, Third Edition, page 2163.

‡ Wood and Bach's *United States Dispensatory*, Eleventh Edition, page 398.

§ Vol. xx., page 163.

‖ *Histoire Naturelle des Drogues Simples*, Fourth Edition, vol. iii., page 693.

¶ See *Pharm. Journ.*, vol. ii., Second Series, page 464.

my communication on Actæa, or Cimicifuga racemosa; at least, none of our authorities refer to it in their published works, and Pereira distinctly states, that "as far as he had observed, the roots sold in this country as black hellebore had a very uniform appearance, and from this he had not had reason to suspect any intermixture of other roots."* At the present time, however, I find that the drug sold as black hellebore varies very much in appearance, other roots or rhizomes being commonly mixed with it, or entirely substituted for it, in fact, I believe it is almost impossible to obtain, at present, black hellebore at all in this country in any quantity. It is not my intention in the present communication to allude to any other adulteration of black hellebore than that of bane-berry; but the general and chemical characteristics which I shall presently give of black hellebore will enable any one to distinguish it with facility from all other rhizomes, with the exception, perhaps, of those of other species of hellebore.

It is somewhat remarkable that the intermixture of bane-berry rhizomes with those of black hellebore should not have hitherto been noticed in this country, as such an intermixture is certainly not of recent origin, for I have lately found specimens of what has been called black hellebore, and which I have proved had been in stock for more than sixteen years, which consisted always entirely of bane-berry rhizomes. At present, in some instances, the whole of the drug forwarded to me as black hellebore consisted of bane-berry, and in other instances I have found a large intermixture of the false with the genuine rhizomes.

Upon a superficial examination, the resemblance between black hellebore and bane-berry rhizomes is most remarkable; but on a more careful inspection, we find marked distinctive characters, both physical and chemical, between them. Some of these we shall now refer to, and in order that they may be more readily noticed, we place them in a tabular form as follows :—

1. General Distinctive Characters.

Black Hellebore.	*Bane-berry.*
Rhizome variously twisted and knotted; and presenting on its upper surface, when of any length, short projections at intervals.	Rhizome twisted and knotted, but less so than black hellebore; and presenting on its upper surface large and long projections.
Greyish or brownish in colour, and without any perceptible red tinge.	Reddish-brown in colour.
Internally of a soft texture, and medullary appearance.	Dense and woody internally.
No marked odour in a dried state.	Odour somewat narcotic, especially when freshly dried or moistened.
Taste bitter, very acrid, biting, and nauseous, more especially so if freshly dried.	Taste bitter, but very slightly acrid, even when in a fresh state.
A transverse section of the radicles exhibits an undivided, or but very slightly stellate meditullium.	A transverse section of the radicles exhibits a meditullium, in which the woody bundles are arranged in a cruciate, triangular, or more or less radiate manner, according to their size.

The best of all the distinctive characters alluded to above, and one which with ordinary care will at once enable any one to distinguish with facility the two rhizomes, is that presented by the transverse sections of their respective radicles.

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* Pereira's *Mat. Med.*, Third Edition, vol. ii., page 2163.

2. Chemical Distinctive Characters.

An infusion, made by macerating one ounce of black hellebore and bane-berry separately in thirty ounces of boiling water, exhibited the following distinctive chemical reactions :—

	Black Hellebore.	*Bane-berry.*
Solution of Perchloride of Iron.	Only a slight change of colour, and generally no marked precipitate.	Deep bluish or greenish-black colour, and abundant precipitate.
Solution of Sulphate of Copper.	No perceptible change during the first five minutes.	No immediate change, but in the course of a minute or two the infusion becomes cloudy, and soon deposits a dirty-brown precipitate.
Solution of Chloride of Barium.	No marked change.	Brownish precipitate.
Solution of Chloride of Lime.	Colour of infusion soon destroyed.	Colour of infusion deepened, and a brownish precipitate formed.

The above chemical reactions will no doubt vary to some extent in different specimens, but as I have tried them in several instances, I have no reason to doubt but that they will be found essentially as I have tabulated them. It is always desirable, however, in testing a vegetable substance, to try more than one reagent.

ON THE COLOUR-TESTS FOR STRYCHNIA, AND THE DIAGNOSIS OF THE ALKALOIDS.

Being the substance of part of the Croonian Lectures for 1861, *delivered at the Royal College of Physicians.*

BY WILLIAM A. GUY, M.B., CANTAB.,
Fellow of the College, and Professor of Forensic Medicine, King's College, London.

(*Concluded from page* 15.)

The last of the four questions proposed for solution in my first communication still remains to be discussed. It relates to the diagnosis of the alkaloids, and was expressed in the following terms :—Is it possible by means of the colour-tests, or by any simple modification of them, to distinguish the alkaloids from each other?

Before proceeding to examine this question I must briefly refer to what I have already stated respecting the colour-tests. These tests, as commonly understood, are compound tests, consisting first of the reaction of the alkaloid with sulphuric acid, and then of the reaction of the peroxides of lead and manganese, the bichromate of potash, the ferricyanide of potassium, and the permanganate of potash, with the mixture of the alkaloid and sulphuric acid.

The sulphuric acid produces in strychnia no change of colour. Hence the acid itself becomes a test of no mean value. It serves, as I shall point out more particularly presently, to distinguish strychnia from a considerable number of the alkaloids, and also from several substances which give with sulphuric acid alone coloured reactions, some of which reactions with the acid alone bear a certain resemblance to those of strychnia with sulphuric acid *plus* the bichromate of potash, ferricyanide of potassium, permanganate of potash, peroxide of lead, or peroxide of manganese. In order to distinguish strychnia from other alkaloids, and from the substances to which I have just referred, it is essential that the sulphuric acid should be first applied to, and well mixed with, the strychnia, and that the absence of colour having been noted, the reagents that develop the colour should be in their turn applied. In all that I have said on the subject of the colour-tests for strychnia, and in what I have yet to say, I assume this

mode of procedure to be strictly observed; and I shall continue to speak of these reagents as the colour-producing tests.

I have hitherto assumed that the sulphuric acid is applied *cold;* but I shall presently point out that we may greatly add to the value of this constituent portion of the colour-tests by first warming and then heating the acid solution. A very slight rise of temperature serves to develop very beautiful and characteristic colours in some of the alkaloids, while it does not change the colour of strychnia. A further rise of temperature to the point of causing the mixture to give off vapour, develops colour in strychnia also, and deepens or changes the tints already imparted to the alkaloids previously affected by warming the acid mixture.

The colour imparted to a solution of strychnia in sulphuric acid by raising it to a temperature at which it gives off vapour is not strongly marked. It is a faint yellow or light greenish-brown, differing somewhat in depth of tint with different specimens of strychnia treated in all respects exactly alike. If the acid solution is allowed to cool it no longer acts characteristically with the bichromate of potash or the other tests. Their action is wholly destroyed or greatly impaired. Hence in applying the colour-tests for strychnia we must use concentrated pure sulphuric acid, and use it *cold.*

So much for the first part of the colour-tests. We add to the alkaloid under examination sulphuric acid in small quantity—pure, strong, and cold; and it undergoes no change of colour. The alkaloid, therefore, whatever it may be, belongs to the class of which strychnia is one.

To this cold acid solution of the alkaloid we add a minute fragment of bichromate of potash, ferricyanide of potassium, permanganate of potash, peroxide of lead, or peroxide of manganese. The result is the remarkable development of successive transient, or short-lived, colours already described.

The negative reaction of strong cold sulphuric acid on strychnia, followed by the effect of heat on the acid mixture, and this by the peculiar colours produced by the application of the colour-developing substances to the cold acid mixture, constitute a series of phenomena which afford fair promise of proving the means of a successful diagnosis of the alkaloids.

To this work of distinction I now address myself, and in order to prepare the way more completely for the work of tabular analysis towards which the details given in my former communications have been tending, I must again revert to the question whether the action of the colour-tests on strychnia is, or is not, characteristic, and therefore, diagnostic.

This is a question which must have suggested itself to every chemist engaged in medico-legal inquiries as of the utmost practical importance, and one chemist (Mr. Thomas E. Jenkins) having been employed to investigate a case of suspected poisoning in which the colour-tests gave indications of the presence of strychnia, very properly put the question to the test of experiment, by applying to a variety of active principles, including most of the alkaloids, first, colourless concentrated sulphuric acid, and then a fragment of a crystal of bichromate of potash. The experiments, which were carefully performed, and appear to have been strictly comparable one with another, embraced no less than fifty alkaloids and active principles, derived from the animal as well as the vegetable kingdom, and among them, urea and uric acid, and cantharidine. More than half of these substances differed from strychnia in yielding colour when treated with sulphuric acid. The smaller half resembled strychnia in this respect. But not one of the whole fifty gave with the bichromate of potash the characteristic coloured reactions of strychnia. Feeling that my time would not be wasted in repeating his experiments, and if possible extending them to substances not included in his list, I possessed myself (partly by the kind assistance of Mr. Morson) of all the alkaloids and similar active principles which could be

obtained, and tested them in the same way. To Mr. Jenkins's list, some of which I was not able to procure, I succeeded in adding as many as sixteen new substances. None of these gave the characteristic coloured reactions of strychnia, nor any succession of colours any way resembling them, so that I am now in a condition to assert that strychnia stands alone among sixty-six analogous compounds in the reactions which it gives with sulphuric acid followed by the bichromate of potash.

Mr. Jenkins (as will be seen in the table published by him in the *Chemical News* for October 6, 1860) arranges his reactions in two columns. The first column displays the effect produced by strong sulphuric acid; the second, the changes of colour caused by the addition to the acid solution of the bichromate of potash.

Now this table affords an excellent illustration of the absence of method and logical arrangement. The substances operated on evidently took their places as they chanced to come to hand. Strychnia itself has to be sought out; and substances which give coloured reactions with sulphuric acid, find themselves in contact with others that give a negative result.

And yet the table seems to court the attention of lovers of method and logical order. It is almost impossible to keep one's hands off it. At least one would like to place the substances which are not coloured by sulphuric acid by themselves, and those that are coloured also by themselves. I have undertaken this work of tabulation, and, on inspecting the result, am seized with the same desire to resume the work of arrangement. In both groups there are substances which yield with bichromate of potash the same colours. Why should not these similar reactions be bracketed together? This accordingly I have carried into effect, and the result is a splitting up of the fifty substances into several groups of such moderate dimensions, that a man given to tabular analysis can scarcely resist the additional temptation to try whether some modification of the tests themselves, or some additional tests, or both together, may not lead to a successful separation and elimination of each and all the substances contained in the table.* I now proceed to lay before you in a tabular form the results of a very laborious experimental attempt to distinguish some of the principal alkaloids and active principles, whether derived from the vegetable or animal kingdom, from each other.

As the first object which I had in view was to distinguish the poisonous alkaloids and analogous active principles from each other, these substances are of course admitted into the tables; but I have added to these the active principles of many of our aperient medicines and common articles of diet; and have excluded only such of those substances as were so strongly characterized by colour or odour, as not to be properly grouped with the colourless, or faintly-coloured, and inodorous alkaloids and active principles.† The table, divided for convenience into two, consists, as it is, of as many as thirty-five different substances, closely resembling each other in physical properties and chemical composition, and offering collectively a very difficult subject for tabular analysis. The tables, as you have them before you, are the result of a long series of

* In the lectures given at the College of Physicians, Mr. Jenkins's original table, and the two tabular arrangements alluded to in the text, were sent round. These tables were the more freely used as illustrations of a want of logical arrangement, as the author evidently did not aim at diagnosis, but only at the distinct ascertainment of the peculiar and characteristic reactions of strychnia. The remarks in the text were not, therefore, intended in any respect as a censure of Mr. Jenkins for not adopting an arrangement which, for his purpose, was unnecessary. I may add, that his table comprises several substances which will not be found in the tables I am about to submit. I mean such substances as the kinic and kinovic acids, and such animal products as urea and uric acid.

† To this statement it will be seen that there are one or two exceptions, such as naphthaline, which, though colourless, has the odour of tar.

experiments, and were only made to assume their present form after a great many experimental groupings and transpositions.

The first object which I had in view was to find some simple test which would divide the whole body of active principles comprised in the two tables into two principal groups. Concentrated sulphuric acid, as a constituent of the strychnia colour-tests, was obviously well adapted to this purpose. It has the effect of dissolving the alkaloids and active principles *without change of colour* in the case of one considerable group (Table I.), *and with change of colour* in the case of another considerable group (Table II.). The first group (Table I.) comprises the majority of the active poisonous principles — strychnia, brucia, morphia; atropine, picrotoxia, aconitina; and the animal principle cantharadine. With these and several other alkaloids and active principles, some of which are very harmless ones, concentrated sulphuric acid either produces no change of colour, or a faint yellow, straw, or buff tint.* I speak of *cold concentrated* sulphuric acid, applied as in the preliminary to the colour-tests for strychnia.

The next object which I had in view was to subdivide these two large groups (Tables I. and II.) each into two or more smaller groups by some second test, which might also, perchance, produce in some members of the two groups characteristic reactions, so as to eliminate or separate them at once. For this purpose I tried the effect of warming the acid solution of the alkaloids by passing the porcelain slab through the flame of the spirit lamp, so as to raise the temperature of the liquid to a point short of that at which it gives off vapour. This subsidiary test answered its purpose completely; the group of substances in Table II. which had already given colours, more or less characteristic, with the cold acid, underwent further changes of colour, more or less peculiar; while the group in Table I. which had undergone no change with the cold acid, became subdivided into two leading groups, of which one continued without colour, and the other underwent changes of colour more or less characteristic. In the instances of meconine and of aconitina, the colours developed proved to be peculiar to these substances, so as to lead at once to their elimination from the rest.

By raising still further the temperature of the acid solutions to a point at which vapour was given off, a further separation into distinct groups or classes was found to take place. The six substances which stand first in order in Table I. still remained colourless, while the remainder assumed tints more or less characteristic. Esculine and atropine; picrotoxia, santonine, and narcotine; amygdaline and naphthaline, formed themselves into three distinct groups; while strychnia, brucia, and morphia gave indications of colour less distinct and characteristic.

By this triple test of sulphuric acid, *cold*, *warmed*, and *heated*, the active principles contained in this division (Table I.) have been either eliminated, or split up into manageable groups, awaiting the application of further tests. It seemed natural to select as the next test in order nitric acid—a known characteristic test of brucia and morphia. By applying this test to the several members of the table in succession, codia was isolated from the group of six to

* I ought to state in this place that some of the alkaloids are very sensitive to heat, so that a very slight rise of temperature is followed by a decided development of colour. Hence it is possible that experiments made in a cold room in winter may yield results differing somewhat from the same experiments made in a warm room in the height of summer. It must also be borne in mind that sulphuric acid, if not free from nitric acid, may impart to some of the alkaloids a tint of rose, yellow, or buff, sufficiently deep to justify their removal from Table I. to Table II. It may be well, therefore, to state that the experiments on which the tables are founded were made in the winter, in a room with a fire, but in the morning, before the temperature of the room had been raised to a point approaching summer-heat; and that the acid employed was free from nitric acid.

which it belonged by the distinct yellow colour assumed by the acid solution. Emetine was, in like manner, isolated from the other members of the same group of six, by yielding with the acid a yellow-brown colour. Atropine, again, was distinguished from esculine by giving a negative result, while esculine assumed a distinct yellow colour. In the same way narcotine was detached from its group of three, and naphthaline from its group of two. Again, morphia was distinguished by the rich orange hue given by the acid, together with the red fumes of nitrous acid; and brucia was effectually distinguished from strychnia by the intense red of the former contrasting with the faint tinge of red imparted to ordinary specimens of the latter. For the next eliminating test I have selected sulphuric acid followed by a solution of permanganate of potash, in the proportion of 10 grains of the salt to ℥j. of water. The effect of this test on strychnia was to develop its characteristic colours, strongly contrasted with the altogether different colours given with brucia, and still more with the brown colour imparted to morphia, followed by the bleaching of the liquid. This same test divided the somewhat unmanageable group of four at the top of the table (cantharadine and asparagine, and caffeine and cinchonine) into two small groups of two each. In the first two the immediate effect of the permanganate was a red-brown colour; in the second, a pink. Picrotoxia and santonine gave the same colour (pink) and remained undistinguished. The last and ultimate work of elimination was effected by means of heat applied to the active principle in its solid state. Cantharadine was found to be wholly dissipated by the heat of the spirit lamp, while asparagine gave a bulky carbonaceous deposit. And caffeine was found to present the same difference when compared with cinchonine. Lastly, picrotoxia was found to be distinguished from santonine by the bulky carbonaceous residue with the first, and the scanty deposit of carbon with the second.

Having by this succession of tests obtained a clue to the active principle with which we have been dealing, we should proceed to identify the substance indicated by the table, through its own characteristic tests.

In the second division of the one large table of elimination, or that which comprises active principles coloured by contact with cold sulphuric acid (Table II.), the same succession of tests is employed. Cold concentrated sulphuric acid at once separates this group of seventeen into eight smaller groups of one, two, or six; and the subsequent warming and heating of the coloured acid solutions occasions such marked differences of colour as to nearly complete the work of elimination. But I have added columns showing the effect of nitric acid, and of the solution of permanganate of potash. The application of heat to the alkaloids themselves did not prove necessary to the work of elimination.

I submit these tables primarily as specimens of *Tables of Elimination;* but also incidentally as tables which may prove serviceable to the Chemist. I am not certain that they constitute the best aid which could be devised to the diagnosis of the alkaloids. I thought that they might, perhaps, admit of being simplified by adding to the three columns headed "sulphuric acid" a fourth, showing the deposit of carbon resulting from the continued application of heat to the acid solution of the alkaloid. I tried this reaction in the case of fourteen alkaloids and active principles, comprising all the more active poisons of this class, together with the less important principles, emetine and meconine, and found the alkaloids to differ from each other in the amount of carbonaceous deposit. With strychnia, aconitina, and veratria, for instance, the deposit of carbon was less abundant than with brucia, morphia, atropia, and the other poisonous alkaloids. But the difference was not such as to justify me in using it as a diagnostic property. So also with the direct application of heat to the alkaloids themselves. Strychnia, morphia, atropia, cantharadine, meconine, picrotoxia, and delphinia, after melting, deposited but a scanty carbonaceous ash; while

emetine, aconitina, and digitaline yielded an abundant ash; and brucia, elaterine, veratria, and solanine, yielded an ash intermediate in quantity. This test, again, though fairly applicable to the few cases in Table I., did not seem admissible as a diagnostic on a larger scale. Indeed, the tables, though carefully compiled and based on carefully conducted experiments, are open to the obvious objection that, with different specimens and different quantities of the alkaloids, and with different specimens of sulphuric acid, we may obtain differences of tint, and more or less ready development of colour under increase of temperature. The majority of the reactions, however, will, I believe, be found constant for all specimens of fair average purity. One alkaloid, hyoscyamia, which I was not able to procure, is omitted.*

Of the two tables, Table I. affords the best illustration of a table of elimination. For the sake of brevity, and for other reasons already explained, the figures 1, 2, 3, are added to the words describing the colours developed by the tests. These figures indicate different degrees of intensity. In comparing strychnia with brucia, for instance, the figure (1) attached to the word "yellow" opposite strychnia in the third column means a faint yellow colour, less in degree than that indicated by the figure (2) opposite brucia in the same column. So the word "brown" with the annex 3 in the same column opposite esculine and atropine indicates an intense brown colour; the words red 3 and orange 3 in the column headed nitric acid indicate intense red and orange respectively.

TABLE I.

Alkaloids, &c., giving no Colour with cold Sulphuric Acid.

Alkaloids, &c.	Sulphuric Acid.			Nitric Acid.	Sulphuric Acid, followed by the solution of Permanganate of Potash.	Heat.
	Cold.	Warm.	Hot.			
Cantharadine	0	0	0	0	Red brown	0
Asparagine	0	0	0	0	Red brown	Carbon[3]
Caffeine and Theine	0	0	0	0	Pink	0
Cinchonine	0	0	0	0	Pink	Carbon[3]
Codia	0	0	0	Yellow		
Emetine	0	0	0	Yellow-brown		
Strychnia	0	0	Yellow[1]	Pink[1]	Blue, mulberry, orange	
Brucia	0	0	Yellow[2]	Red[3]	Red, brown, orange, yellow	
Morphia	0	0	Brown	Orange[3]	Brown, then bleached	
Esculine	0	0	Brown[3]	Yellow		
Atropine	0	0	Brown[3]	0		
Meconine	0	Blue				
Aconitina	0	Brown				
Picrotoxia	0	Yellow	Brown	0	Pink	Carbon[3]
Santonine	0	Yellow	Brown	0	Pink	Carbon[1]
Narcotine	0	Yellow	Claret	Yellow		
Amygdaline	0	Pink	Brown	0		
Naphthaline	0	Pink	Brown	Yellow		

* In the lectures at the College of Physicians a table was used which showed the colours actually produced by the action of the several reagents on these poisonous alkaloids and active principles.

TABLE II.

ALKALOIDS, &c., GIVING COLOUR WITH COLD SULPHURIC ACID.

Alkaloids, &c.	Sulphuric Acid.			Nitric Acid.	Sulphuric Acid, followed by the solution of the Permanganate of Potash.
	Cold.	Warm.	Hot.		
Veratria	Orange[3] ...	Scarlet ...	Claret ...	0	
Piperine.....	Orange[3] ...	Red-brown	Green[3] ...	Orange[3]	
Delphinia....	Pink[1] ...	Pink[2] ...	Brown ..	0	Yellow[1]
Salicine	Pink[1] ...	Pink[3] ...	Claret ...	0	Claret
Digitaline ...	Red-brown[1]	Red-brown[2]	Red-brown[3]	0	Buff
Elaterine	Red-brown[1]	Red-brown[2]	Red-brown[3]	0	Pink[3]
Papaverine...	Purple[3] ...	Purple[2] ...	Purple[1] ...	Yellow ...	Green; slate
Paramorphia	Purple[1] ...	Purple[1] ...	Purple[3] ...	Yellow ...	Green; brown
Quina.....	Yellow ...	Yellow ...	Yellow-brown	Yellow	
Aloine	Yellow ...	Yellow[3] ...	Green ...	Orange	
Jalapine	Yellow ...	Orange[3] ...	Red-brown ...	Yellow	
Narceine	Yellow ...	Red-brown[3]	Red-brown[3]	Green-brown[3]	Buff
Phloritzin....	Yellow ...	Red-brown[3]	Red-brown[3]	Red-brown[3]	Pink[3]
Solania.....	Yellow[3] ...	Brown[2] ...	Brown[3] ...	0	
Cubebine.....	Pink[3] ...			Yellow	
Quinoidin	Brown ...	Brown ...	Brown ...	0	
Sanguinarine	Red-brown[2]	Claret ...	Claret ...	Red-brown[2]	

LIQUID DIFFUSION APPLIED TO ANALYSIS.

BY THOMAS GRAHAM, ESQ., F.R.S.,
Master of the Mint.

THE unequal diffusibility of different substances in water appears to present means of separation not unlike those long derived from unequal volatility. For as regards diffusion, there exists a "volatile" and also a "fixed" class of substances; and these distinctions appear to correspond with differences in molecular constitution of a fundamental nature. Much value is attached to diffusion, as affording the means of bringing out clearly, and subjecting to numerical expression, the distinctive properties of what appear to be two great divisions of chemical substances.

The first, or *diffusive* class of substances, are marked by their tendency to crystallize, either alone or in combination with water.

When in a state of solution they are held by the solvent with a certain force, so as to affect the volatility of water by their presence. The solution is generally free from viscosity, and is always sapid. Their reactions are energetic and quickly affected. This is the class of *crystalloids*.

The other class, of low diffusibility, may be named *colloids*, as they appear to be typified by animal gelatine. They have little, if any, tendency to crystallize, and they affect a vitreous structure. The planes of the crystal, with its hardness and brittleness, are replaced in the colloid by rounded outlines with more or less softness and toughness of texture. Water of crystallization is represented by water of gelatination. Colloids are held in solution by a feeble power, and have little effect on the volatility of the solvent. They are also precipitated from their solution by the addition of crystalloids. The solution of colloids has always a certain degree of viscosity or gumminess, when concentrated. They appear to be insipid or wholly tasteless, unless when they undergo decomposition upon the palate and give rise to sapid crystalloids. Their solid

hydrates are gelatinous bodies. They are united to water with a force of low intensity; and such is the character of the combinations in general between a colloid and a crystalloid, even although the latter may be a powerful reagent in its own class, such as an acid or an alkali. In their chemical reactions, the crystalloidal appears the energetic form, and the colloidal the inert form of matter. The combining equivalent of the colloid appears always to be high, and it has a heavy molecule. Among the colloids rank hydrated silicic acid, and a number of soluble hydrated metallic peroxites, of which little has hitherto been known; also starch, the vegetable gums and dextrin, caramel, tannin, albumen, and vegetable and animal extractive matters. The peculiar structure and chemical indifference of colloids appear to adapt them for the animal organization, of which they become the plastic elements.

Although the two classes are widely separated in their properties, a complete parallelism appears to hold between them. Their existence in nature appears to call for a corresponding division of chemistry into a crystalloid and a colloid department.

Although chemically inert in the ordinary sense, colloids possess a comparative activity of their own, arising out of their physical properties. While the rigidity of the crystalline structure shuts out external impressions, the softness of the gelatinous colloid partakes of fluidity, and enables the colloid to become a medium for liquid diffusion, like water itself. The same penetrability appears to take the form of a capacity for cementation in such colloids as can exist at a high temperature. Hence a wide sensibility on the part of colloids to external agents. Another eminently characteristic quality of colloids, is their mutability. Their existence is a continued metastasis. A colloid may be compared in this respect to water while existing liquid at a temperature below its usual freezing point, or to a supersaturated saline solution. The solution of hydrated silicic acid, for instance, is easily obtained in a state of purity, but cannot be preserved. It may remain fluid for days or weeks in a sealed tube, but is sure to gelantize at last. Nor does the change of this colloid appear to stop at that point. For the mineral forms of silicic acid deposited from water, such as flint, are found to have passed, during the geological ages of their existence, from the vitreous or colloidal into the crystalline condition (H. Rose). The colloidal is in fact a dynamical state of matter; the crystalloidal being the statical condition. The colloid possesses ENERGIA. It may be looked upon as the probable primary source of the force appearing in the phenomena of vitality, as living matter without form. To the gradual matter also in which colloidal changes take place (for they always demand time as an element), may the chronic nature and periodicity of vital phenomena be ultimately referred.

For the separation of unequally diffusive crystalloids from each other, jar diffusion was had recourse to. The mixed solution was conveyed by means of a pipette to the bottom of a column of water contained in a cylindrical glass jar. A kind of cohobation takes place, a portion of the most diffusing substance rising and separating from the less diffusive substances, more and more completing, as it ascends.

The separation of a crystalloid from a colloid is more properly effected by a combination of diffusion with the action of a septum composed of an insoluble colloidal material. Animal membrane will serve for the latter purpose, or a film of gelatinous starch, hydrated gelatin itself, albumen, or animal mucus. But by much the most effective septum used was paper, as it is metamorphosed by sulphuric acid (Gaine). It is now supplied by Messrs. De la Rue, and has become familiar under the name of "vegetable parchment" or "parchment paper." From sheet gutta percha a flat hoop is formed, eight or ten inches in diameter by three inches in depth, and one side is covered by a disc of parchment-paper, so as to form a vessel like a sieve. A mixed solution, which

may be supposed to contain sugar and gum, is placed upon the septum to a depth of half an inch, and the instrument then floated upon a considerable volume of water contained in a basin. Three-fourths of the sugar diffuses out in twenty-four hours, and so free from gum as to be scarcely affected by subacetate of lead, and to crystallize on the evaporation of the external water by the heat of a water-bath.

The unequal action of the septum, which causes the separation described, appears to depend upon this:—The crystalloid sugar is capable of taking water from the hydrated colloidal septum, and thus obtains a medium for diffusion; but the colloid gum has little or no power to separate the combined water of the same septum, and does not therefore open the door for its escape by diffusion, as the sugar does. This separating action of the colloidal septum is spoken of as *dialysis*.

Dialysis was applied to the preparation of various colloids. The mixed solution obtained by pouring silicate of soda into water acidulated with hydrochloric acid, was placed upon a parchment-paper dialyser and allowed to diffuse into water, the latter being occasionally changed. After the lapse of five days seven-eighths of the original silicic acid was found to remain liquid upon the septum, and to be so free from hydrochloric acid and chloride of sodium as not to give a precipitate with acid nitrate of silver. The true hydrated alumina, and also Mr. Crum's metalumina, were obtained soluble by dialysing solutions of these oxides in the chloride and acetate of the same metal. So also the hydrated peroxide of iron, in addition to the hydrated metaperoxide of iron of M. Péan de Saint Gilles, and the soluble hydrated chromic oxide. The varieties of prussian blue are obtained soluble by dialysing their solution in oxalate of ammonia, the latter salt diffusing away. Stannic and titanic acids appear as insoluble gelatinous hydrates.

A solution of gum-arabic (gummate of lime), dialysed after an addition of hydrochloric acid, gave at once the pure gummic acid of Frémy. Soluble albumen is obtained in a state of purity by dialysing that substance with an addition of acetic acid.

Caramel of sugar, purified by repeated precipitation by alcohol and afterwards by dialysis, contains more carbon than any of the caramelic bodies of Gélis; it forms a tremulous jelly when concentrated, and appears decidedly colloidal. Caramel, like all other colloids, has a soluble and an insoluble modification. The latter has its solubility restored by the action of alkali, followed by that of acetic acid and subsequent dialysis.

Dialysis proves highly useful in separating arsenious acid and metallic poisons from organic fluids. Defibrinated blood, milk, and other organic fluids charged with a few milligrammes of arsenious acid, and placed upon the dialyser, were found to impart the greater proportion of the arsenious acid to the external water in the course of twenty-four hours. The diffusate was so free from organic matter, that the metal could be readily precipitated by sulphuretted hydrogen, and the quantity weighed.

Ice at or near its melting-point appears to be a colloidal substance, and exhibits a resemblance to a firm jelly in elasticity, the tendency to rend, and to redintegrate on contact.

The consideration of the properties of gelatinous colloids appears to show that osmose is principally an affair of the dehydration of the gelatinous septum under influences having a catalytic character, and that the phenomenon is independent of diffusion. The colloidal septum is capable of hydrating itself to a higher degree in contact with pure water than in contact with a saline solution. Colloidal septa, swollen in consequence of contact with dilute acid or alkali, appear to acquire increased sensibility to osmose, in consequence of their unusually high degree of hydration.—*Proceedings of the Royal Society.*

REPORT OF THE RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION, AND OF THE APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

The Artificial Production of Ice.—Some time back an ingenious process was described, and practically brought into operation, for the manufacture of ice by the evaporation of ether *in vacuo*. A somewhat complicated apparatus was, however, necessary for the purpose. Quite recently, M. Carré has communicated to the French Academy a means of producing low temperatures on the large scale which appears very simple and inexpensive. It depends on the rapid evaporation of condensed ammoniacal gas.

The form of apparatus described by M. Carré is of very simple construction. It consists of two ordinary cylindrical boilers, one of which is four times the capacity of the other, and is three-quarters filled with the strongest solution of ammonia. The two vessels are connected by a tube with a tap. Before closing the apparatus the whole of the air is driven out. Heat is then applied to the large vessel, and the solution raised to a temperature of about 130° or 140°, the connecting tap being open. Under these circumstances, the ammoniacal gas is disengaged from the solution, and, having no escape, liquefies in the small boiler under the increasing pressure. When this has occurred to the full extent, the tap is closed, and the large boiler allowed to cool down to the ordinary temperature. We thus have liquefied ammonia in one vessel, and cold water with a vacuous space above it in the other.

The small boiler is then surrounded with cold water, and the tube of communication opened. The condensed gas rushes back into the large vessel, and the rapid evaporation produces such intense cold as to effect the freezing of the water surrounding the small boiler. The ice thus formed may then be removed, and the operation repeated. It is very necessary to have the apparatus perfectly air-tight, and if this be effected the same ammonia serves for an endless number of operations. The pressure exerted on the apparatus amounts to eight or ten atmospheres, and the temperature of the ammonia during its volatilization sinks to −40°.

Several different forms of the apparatus have been devised, but all based upon the same principle. M. Carré has also constructed it in such a manner that its action shall be continuous.

On the Solidification of Carbonic Acid.—By the apparatus of Thilorier, solidified carbonic acid is obtained in the form of *snow*. MM. Loir and Drion have succeeded in producing this acid in a state resembling *ice*. The process adopted by these chemists is novel and interesting, inasmuch as very little pressure is employed. Their method consists, in fact, in exposing the gas to the cold produced during the evaporation of liquefied ammonia into a vacuum.

A glass vessel or receiver, furnished with two openings, is filled with liquefied ammonia. Into one opening is fitted a tube, the sealed end of which passes to the bottom of the receiver. The other opening is connected with an air pump. The carbonic acid is generated by heating bicarbonate of soda, and is brought into the tube which dips into the ammonia. The air having been chased out of the apparatus, the carbonic acid is disengaged under a pressure of three or four atmospheres, and the ammonia allowed to escape into the vacuum. Under these circumstances, transparent crystals are seen to form in the interior of the tube which rapidly increase in size. In the course of half an hour, twenty-five grammes of glacial carbonic acid may be thus obtained, consisting of distinct crystals.

The Chemical Nature of the Silkworm's Skin.—M. S. de Luca has shown that the skin of the silkworm will yield a non-nitrogenized substance, having the composition of vegetable cellulose, and capable of ready conversion into a fermentable sugar. This body is obtained as follows:—Several pounds of silkworms are boiled with successive quantities of concentrated hydrochloric acid for some hours. After washing by decantation, the product thus obtained is boiled with a concentrated solution of potash. The portion still insoluble is next thoroughly and perfectly washed, to remove all traces of alkali, and dried with a gentle heat.

The substance thus obtained is white, opaque, and devoid of nitrogen. Treated in the cold with oil of vitriol, it slowly dissolves, forming a slightly coloured, dense, mucilaginous fluid. This, largely diluted and boiled for an hour or two, then neutralized with chalk, filtered, and the solution evaporated, yields a sweet syrupy residue, which presents all the reactions of sugar. It reduces oxide of copper; undergoes fermentation with yeast, yielding alcohol and pure carbonic acid; boiled with a solution of common salt, it furnishes crystals having the composition $C_{24}\,H_{24}\,O_{24}+2\,HO+Na\,Cl$.

The dry substance resulting from the action of the hydrochloric acid and potash is also capable, like cellulose, of slowly dissolving in cuprate of ammonia, and of being re-precipitated from solution by acid, in the form of a white flocculent matter. The precipitate answers to all the reactions of vegetable cellulose.

These results accord with those obtained by other observers, and show that the silkworm yields a substance isomeric with vegetable cellulose, and analogous to chitine and tunicine.

Preparation of Perchloride of Iron.—A discussion has taken place between some French Pharmaceutists as to the best method of obtaining a uniform solution of perchloride of iron for use in medicine, which shall be perfectly definite in strength, and devoid of all free acid. The ordinary processes for this purpose do not appear to give good results. If sesquioxide of iron be dissolved in hydrochloric acid, it is very difficult to get rid of all excess of acid without at the same time rendering a portion of the salt basic. The crystals which may be obtained from the acid liquor cannot be advantageously used, because they consist of a hydro-chlorate of chloride of iron, and are consequently too acid; moreover, they are difficult to keep without change.

M. Lebaique recommends the employment of *sublimed perchloride of iron.* This body is most readily and easily obtained by passing a current of chlorine gas over iron nails or tacks, which are slightly heated. The iron is first converted into protochloride, and then into perchloride. At the end of the operation the heat is increased so as to sublime the product, which is then obtained in a state of perfect purity. A glass flask forms a convenient vessel for the experiment.

The perchloride of iron thus crystallized by sublimation is chemically neutral, and of unvariable composition. It dissolves in water with extreme facility, forming a limpid clear solution, which keeps without alteration.

White Gunpowder.—M. Pohl has been engaged in some experiments on the white gunpowder invented by M. Augendre, which consisted of a mixture of one part ferrocyanide of potassium, one part cane sugar, and two parts chlorate of potash. M. Pohl finds that a better result is obtained when the ingredients are mixed in the following proportions:—

Ferrocyanide Potassium	28 parts	or 1 equiv.
Sugar	23 "	or 1 "
Chlorate of Potash	46 "	or 3 "

The products of the explosion appear to consist of nitrogen, carbonic oxide, carbonic acid and the vapour of water, cyanide of potassium, chloride of potassium and a bicarbide of iron (FeC_2). One hundred parts by weight of the powder yield 47.43 parts by weight of gaseous matter, and 52.55 of saline residue. Ordinary black powder has been calculated to yield 68.06 of solid residue, and 31.38 of gaseous products. M. Pohl calculates the relative volume of gas produced by the explosion of equal weights of the white and ordinary black powder in a closed space to be as 1.67 of the former to one of the latter. Hence, as the action of an explosive powder principally depends on the volume of the gases formed, for equal weights the new white powder would produce 1.67 times the action of the other. But for equal volumes of the powder the ratio would be different, because the white powder is not so dense as the black; for equal volumes the white would do 1.292 the work of the other. To produce the same explosive effect, 60 parts by weight of the new would replace 100 parts of the old. The weights of the residues in the two cases would be 31.53 from the white, and 68 from the black. One of the advantages attending the white powder is, that the temperature of the flame is much lower; consequently a greater number of shots could be fired without unduly heating the

weapon. The new powder can scarcely be exploded by pressure or percussion. It is only the heaviest blow of iron on iron that will effect its combustion. Friction of wood on metal, rubbing between stones, &c., are of no avail. Its preparation also is more readily effected; the ingredients simply require powdering and mixing, and it can be kept for any time without change. Its explosion is more energetic in its action than ordinary powder; it approaches gun-cotton in this respect.

On the Preparation of Chloroform.—M. Pettenkofer has been examining the process for the preparation of chloroform. He finds that the temperature at which the operation is conducted has an important effect on the result. He states that the temperature should never rise above 162° F., nor fall below 149°. In the first case the product will be impure and contain free chlorine; in the second case the product will be pure, but very small in quantity.

He recommends the operation to be conducted in a cask attached to a condensing apparatus. The chloride of lime is diffused through boiling water, and introduced into the cask by means of a funnel tube. The spirit of wine is added when the temperature reaches 155° F. The funnel tube is then closed, and the operation allowed to go on by itself. If, however, the temperature should fall below the point indicated, it must be maintained by sending in a jet of steam.

On the small scale a carboy is indicated as a convenient vessel to employ. The chloride of lime and water can, if necessary, be first heated up to the right point by a jet of steam, and then the spirit added. If the distillatory apparatus is proper and the spirit pure, the resulting chloroform is perfectly purified by agitation with a solution of carbonate of soda and then with water.

THE VEGETABLE PRODUCTS OF SIAM.

BY SIR ROBERT H. SCHOMBURGK, K.C.H., BRITISH CONSUL-GENERAL OF SIAM.

The vegetable productions of a country of such vast extent as Siam, lying under the tropics and favoured by periodical rains, are very numerous. Rice, sugar, and pepper are, however, the staple articles; the first serving not only for home consumption, but a large quantity is exported to China. Several varieties of rice are raised; some account as many as forty, but four species are principally cultivated: namely, the common rice, of a white colour, much resembling the rice of Carolina; the mountain-rice; the glutinous, and the red rice. The first kind is mostly exported.

Rice has hitherto been the principal export from Siam: in 1858 not less than 100,000 tons were exported, principally to China. It is grown over the whole plain of Siam. About the end of June, when the water is rising up the country, the ground is prepared and planted. Na-muang rice is sown broadcast in the paddy-fields, and not transplanted, and is much superior to the Na-suen, having a longer and better grain, and being less liable to get broken. The white rice is prepared by pounding it, in the same manner as in China. A small quantity of Pulat rice is also grown, and is occasionally shipped to Singapore.

Next to rice, sugar is the largest article of export from Siam. Nakhon-Yaisi and Petrio are the principal sugar districts; but it is also produced at Paklat, Bangpasoi, Chantibon, and Petchaburi, in considerable quantities. The owners of the mills seldom cultivate the canes themselves, but purchase it standing in the fields from the growers, who have usually money advanced to them by the mill-owners at the commencement of the season, to enable them to plant on their ground; they in return being bound to sell all their cane at a fixed price to the person lending the money, besides paying interest at the usual rate.

The cultivation of the sugar-cane has greatly increased. It is mostly in the hands of the Chinese. The extraction of the juice of the cane and its manufacture into sugar are carried on in a very primitive manner, without any of the modern improvements, to obtain from the cane the largest possible quantity of a superior quality of sugar. I have seen samples of sugar from Nakhon-Yaisi which left nothing to desire, either as regarded grain or appearance; but this is only an instance, while other districts produce a quality very inferior. The greatest quantity of sugar is made in the neighbourhood of Bangkok and the adjacent provinces, to where the tidal waters extend. Here irrigation, in cases of drought, may be carried

on with the greatest convenience; and, were there sufficient labouring hands to attend to its cultivation, ten times the quantity of sugar now produced might be raised in those localities to which the tidal waters extend, setting aside other places appropriate for its cultivation.*

With better machinery, the manufacture of sugar in Siam might be greatly improved. White or clayed sugar, red unclayed, and yellow, are the three descriptions brought to market. The yellow sugar is always deficient in grain; most of it comes from up the country, and from Chantibon: it seems to be a peculiar description of sugar, and the Chinese manufacturers say they are unable to grain it; it is usually pretty dry.

Palm-sugar is manufactured to a considerable amount at Pitchaburé; but it is all consumed in the country. This is not the same as the date sugar known in Europe.

The best sugar is procurable in March and April; that which is made in the two following months is mostly from the second boiling, and is much lower in quality. The quantity produced during each of the two seasons 1857 and 1858 is supposed to have been about 100,000 piculs (of 133⅓ lb.) of white, and the same quantity of red and yellow together. The yellow sugar generally costs a little more than the red.

Amongst the woods which are used for architecture or the construction of ships, the teak-wood stands prominently forward. The tree is known to botanists under the name of *Tectona grandis*, and is confined to only a few localities. It is considered the strongest and most durable timber of India, or perhaps even in the world, the greenheart of Guiana only vying with it. In Siam it has not been found in large quantities south of latitude 16° North. The greatest supply to the Bangkok market arrives from the province of Sangkalock, the capital of which, bearing the same name, is placed in Sir John Bowring's map in latitude 18° 30′ North.

Large forests of teak exist on the Burmese boundaries. The logs, when dry enough to float, are made into rafts and floated down the rivers to Bangkok, where they are usually sawn up. The most suitable form for exportation is planks five inches in thickness. The supply has almost entirely ceased, owing to the high prices and scarceness of wood. The tree is now fully 50 per cent. higher than it was in former years.

A number of woods, the produce of the forests in the interior of Siam, might become of importance, were their qualities for naval or civil architecture, or as woods proper for ornamental purposes, sufficiently known. I would mention, amongst others, the Takieng, which, as far as regards size and quality, might become a rival to the teakwood, possessing, moreover, the great advantage that it may be easily bent by artificial means. Very little is known of the tree which produces the Takieng, and I think it deserves a closer examination, how far it might be profitably employed for naval architecture. I have seen, at the building sheds of the first king, a log of that wood, which was being prepared for the construction of a war-canoe, measuring 135 feet, perfectly sound and without a flaw. This wood is brought from the south-eastern provinces, and generally used for planking the bottoms of ships. It ought likewise to be stated, that trees belonging to the Pine genus are not uncommon, principally on the eastern coast of the Gulf of Siam, which might furnish liquid bitumen for the preparation of pitch or tar.

Of ornamental woods, useful for cabinet-makers and joiners, the following form already articles of export: namely, rosewood, ebony, satin-wood, krachi, and a number of others. The spontaneous produce of the forests are entirely unknown to cabinet-makers, although their colour and suitableness to receive a high polish would render them valuable additions to the articles of export.†

Rosewood is brought from the west coast of the Gulf of Siam: the grain is not so

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* As far as I have been able to judge, from what I have hitherto seen of the coast regions of Siam, they strongly resemble those of British Guiana, one of the greatest sugar-producing colonies of the British possessions in the New World.

† A collection of walking-sticks made of indigenous woods of Siam was given to me as a present. The native names of these woods are—samchsan, krapi-kao, quai khanrad, praduket, marit, chin-chun (or rosewood), phra-ya-ya, mun kun, lamut kao, dam (black dam), and mampro (cocoa-nut wood).

close as South American wood generally. A large quantity is exported yearly to Shanghai and other Chinese ports. The quality of the Siamese ebony is said to be not very superior: a little is exported every year by the junks. A small quantity of satin-wood is shipped to China. None of a large size can be obtained. It is brought from the east coast of the Gulf.

The bamboo furnishes an excellent material, in its outer bark, for the manufacture of furniture. The first king, in his saloon near the aviary, has a set of chairs made of it, very nice in appearance.

Amongst dye-woods, the principal is the sapan (*Cæsalpinia Sappan*), of which large quantities are exported. It is the spontaneous produce of the forests of the northern provinces of Siam and the frontier hills dividing that country from Tenasserim. It has been asserted that the roots of this tree afford the dyeing matter in a much larger quantity than either the trunk or the branches.

There are enormous forests of this wood in the upper parts of the country, and down the west coast of the Gulf of Siam. The greater part of the supplies brought to Bangkok comes from Soupan and Bang Chang, also from the west coast of the Gulf. From various places up the country a considerable quantity of block sapan-wood has been floated down the river. It has, however, only had the bark and a small portion of the outer wood chipped off, and requires to be re-chipped in order to remove all the outside white wood, and leave it a uniform bright colour.

A beautiful dye of a brilliant yellow is procured from the heart of the jack-tree (*Artocarpus integrifolia*). This wood deserves a closer examination, whether it might not become of importance to commerce, not only as a dye, but likewise to the cabinet-maker. It must, however, be understood that it is only the heart of the tree which can be employed for such purposes : its outer part (and this is likewise the case with the tree which furnishes the beautiful letter-wood of Guiana, which belongs, according to botanical classification, to the same family as the jack-tree) is soft and useless.

The natives obtain a fine red dye from the roots of the *Morinda citrifolia ;* and I have seen silk cloth, manufactured here, of a *green* colour, which, I was given to understand, was extracted from a vegetable substance procured in the forests of the interior. This green dye had much more lustre than sap-green; and if it be really a vegetable production, it deserves further inquiries.

The wood of a species of mangrove yields a red colour; and the bark of the common kind (*Rhizophora Mangle*) is used in tanning, and a small quantity of it is exported.

Several species of plants furnishing indigo grow spontaneously in the interior. An attempt has recently been made by a British subject to manufacture the dye from these plants ; but he has not succeeded in rendering it profitable, in consequence of which he has given up the speculation. Safflower (*Carthamus tinctorius*), cultivated in Spain, Egypt, &c., is likewise produced in Siam, and sold for its colouring matter. This refers equally to saffron (*Crocus sativus*), and to turmeric, the rhizome of *Curcuma longa*, which is used in dyeing yellow, and as an ingredient in the preparation of curry-powder: however, only sufficient for home consumption is cultivated.

Gamboge is the gum-resin of a tree belonging, according to botanical classification, to the natural family of *Clusiaceæ*. It is employed as a pigment, and as an active medicine. The best quality is brought to Siam from Cambodia, and is considered to be the produce of *Garcinia Cochinchinensis*. An incision having been made into the tree, the gum is collected into hollow bamboos, which, after the secretion has become dry, are broken : hence the drug receives a cylindrical appearance. An inferior quality is brought down from the Laos country, which is in lumps.

The rich red-coloured resin called dragon's blood is obtained from a species of rattan (*Calamus Draco*), which is gathered within the forests of Siam. It is well known that this substance is principally used to tinge varnishes and lacquers.

Bishop Pallegoix speaks of a varnish being obtained from a species of banana-tree by incision. Neither the sun nor the rain has influence upon this substance; hence it is employed for securing the gilding of Siamese idols. It might be employed with great advantage in Europe, for such monuments and ornaments as are gilded, and exposed to the influence of the atmosphere.

I do not believe that this varnish is obtained from a plant which belongs to the *Musa* tribe; it is much more probable that it is procured from the theet-tsee or kheu, a plant called by Wallich *Melanorrhœa usitatissima.* The milk from which the varnish is prepared, flows from the tree after an incision has been made into the trunk, and is very caustic, causing pustules where it comes in contact with the skin. This very circumstance does not render it likely that the vegetable production which yields the varnish belongs to the tribe of plants which the bishop designates.*

Wood-oils, which more properly ought to be called resinous balsams, are yielded by *Dipterocarpus trinervis* and allied species. They give to teakwood a fine polish, and are substituted in house decorations for the coloured paints for verandahs, window-sashes, doors, &c.

Mr. Edward O'Riley, when speaking of the vegetable products of the Tenasserim provinces, says that it is not generally known that the oil of the *Dipteraceæ* possesses the same quality as the balsam of copaiba.† This had been stated previously by Dr. Blume, and it has been recommended lately in England.

These balsamic resins, which are yielded by numerous trees of the forests of Siam, deserve much more attention than they have hitherto received.

The damar, or dammer, is the resinous produce of trees belonging to the same kind which yield the wood-oil, namely, *Shorea* and *Tumbugaia.* The damar is found at the foot of the trees, much like the gum anime of South America, and is frequently fished up (just like the latter), floating on the surface of rivers, carried there by floods of rain. No care is taken in collecting it; hence it is frequently mixed with extraneous substances, which greatly lessen its value. It is used as a substitute for pitch or tar, and forms an article of export to Singapore.

Gum benzoin, or benjamin (probably the produce of *Styrax Benzoin*), is brought to Bangkok from the Laos country, and a kind of camphor, perhaps the balsamic resin of *Dryobalanops Camphora*, from the Malay peninsula. The tree is destroyed to produce the gum benjamin. The bark is chipped all over; and after the gum has exuded and hardened, it is found between the stem and bark, which is then stripped off. The tree is called kanyan by the Siamese. The gum which exudes naturally has a much stronger perfume than that procured by cutting; but, from dropping on the ground, it is a good deal mixed with earth and other impurities. It is not white, but of a clear brownish colour. From the manner in which it is brought down the country, it is much destroyed, being broken into dust, often from the knocking about which it receives before arriving at the navigable parts of the Menam. The common way of bringing it to the river is in small baskets, strapped in pairs, across bullocks' backs, which are never taken off till arriving at the boats.

The eagle or aquila wood, or lign-aloes, a fragrant substance, is yielded by *Aloexylon Agallochum.* Another kind, which is considered less valuable, comes from *Aquilaria Agallochum.* The fragrant resinous substance which it contains is highly prized by the Chinese, to which country it is only exported. This refers likewise to krachi-wood and angrai bark; the former being used for incense, the latter for medicinal purposes.

Amongst plants which are employed for medicinal purposes, must be mentioned the beyche-nut or nux vomica, obtained from the Laos country, which forms an article of export to China.

Til-seed, the produce of *Sesamum indicum*, containing an abundance of an oil which, when fresh, can scarcely be distinguished from olive-oil, forms an important article of export.

Pangtarai seeds, the produce of *Arachis hypogœa*, or "ground nuts," are cultivated by the natives for expressing a bland oil, which is mostly used for home consumption; some of the nuts are, however, exported. The name in Siamese is tueh-esong.

A great deal of oil is obtained from the cocoa-nut, which is mostly used for burning in lamps by the inhabitants, very little being exported.

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* I have every reason to believe that the varnish alluded to by the bishop is prepared from the milk of a species of *Ficus*, called tomsie by the Siamese.

† *Journal of the Indian Archipelago*, vol. iv., p. 62.

Areca Catechu, a slender graceful palm, is extensively cultivated for its fruits, known under the name of betel-nuts, so largely employed in chewing by the Siamese and other Eastern nations, as affording a stimulant. It has been observed that the Asiatic nations would rather forego meat and drink than their favourite betel-nuts. A small quantity are exported to China. May and June are the months when the largest quantity can be procured ; but, though an article of very large consumption in the country, it is not grown to any extent for exportation. What is exported is mostly grown about Petrio, and down the west coast of the Gulf.

The leaf of the betel pepper (*Piper betle*) is inseparable from the use of the betel-nut, the kernel of which is wrapped in a leaf of that plant, over which a small quantity of quicklime is spread, to which a fine pink colour is given by mixing with it the rhizome of the *Curcuma longa*, or turmeric. This rhizome, as already observed, forms one of the chief ingredients of the curry powders of India.*

Returning to the useful productions of the Palm tribe, I have to mention the sago, and a species of palm-sugar or jaggery, the latter of which is prepared from the juice, procured by incision, from the spathe or flowering spike of the *Borassus gomutus*, before it is fully expanded. The juice goes quickly over into fermentation; but, by evaporation, the palm-sugar is obtained, and is sold in earthen pots at the bazaars of Bangkok.

Amongst the spices cultivated in Siam, pepper deserves principally to be mentioned. The greater part is cultivated in the province of Chantibon, where, likewise, a small quantity of white pepper is manufactured, which, however, has not as yet become an important article of export.

I have already mentioned the betel, and the use which is made of its leaves, and may likewise observe that another species, the sirih (*Chavica betle* or *Siriboa*), is equally cultivated for a similar purpose. Two kinds of cardamoms are produced in Siam, and are exported. The best are obtained from several species of the genus *Elettaria* or *Alpinia;* an inferior kind is called bastard cardamoms, which are brought here from the country of the Laos. They are described as the seed of a tree (or plant?) of about a man's height, at the end of the branches of which grow clusters of flowers, which produce the bastard cardamoms. Ginger is cultivated with the greatest facility, but only a small quantity is exported, the root being mostly used for home consumption.

Amongst the fibres of plants growing in Siam useful for textile fabrics, a species of hemp has been exported which is said to be prepared from a plant resembling a nettle in appearance. This has probably been obtained from the *Urtica tenacissima*, the fibres of which have been pronounced identical with the celebrated China grass. The real hemp is likewise cultivated, not so much for its fibres, as for extracting its intoxicating and narcotic qualities, for the preparation of the haschisch of the Arabs or guncha of the Siamese, which is used for the same purposes as opium, producing, when being smoked, exhilarating effects, with subsequent prostration and sleep.† The cultivation of cotton has not received that attention which it deserves. Small quantities are produced in the Laos country, samples of which I have transmitted to her Majesty's Government. The great distance of the country where it is at present cultivated, and the difficulty of transport to Bangkok from the interior, have no doubt injuriously operated in preventing the development of the trade. Judging from the countries that produce cotton which I have visited—namely, the United States, the West Indies, and Guiana—I see no reason why the alluvial districts of Siam should not produce as fine a cotton as the countries previously stated. A want is seriously felt to effect an extensive cultivation—namely, the scarcity of labourers. The distance of the country where cotton is

* The proper colour of the turmeric, under which name it is generally known, is yellow; hence it is employed to give a yellow colour to the skin of women and children, a custom which is much practised by the highest and lowest of the Siamese.

† A somewhat similar effect is produced by the seeds of the *Datura Stramonium* and *Datura fatuosa*, which, it is asserted, the talpoins, or priests, make frequent use of to procure fantastic dreams and ravings. They assert that they take it to sharpen their memory. It is stated that the priests of the Delphic Temple used the seeds of the *Datura Stramonium* to cause that state, bordering on raving, during which their words were considered prophetic.

cultivated from Bangkok is very great; and as the article is so bulky for transport in canoes down the river, this is one of the circumstances which has operated against a greater development of this trade. To obviate this difficulty in some degree, her Majesty's Government has included amongst the presents forwarded to the sovereigns of Siam a hydraulic press, to compress the cotton into bales.

A substance called silk or tree cotton is much employed by the Siamese for stuffing beds, cushions, &c. This is the produce of different species of *Bombax* and *Eriodendron*, very large trees, the seeds of which are enveloped in long hairs, but, as they do not spin like cotton, in consequence of no adhesion existing between the hairs, the substance loses its importance, except as employed for the purposes mentioned.

The coffee of Siam is of a superior description, resembling the Mocha bean : its cultivation is, however, but sparingly attended to, being even insufficient for home consumption. If there were more attention paid to the cultivation, it might form one of the principal articles of export. The tree grows luxuriantly, and is covered with berries. The tobacco of Siam is of a very good quality ; scarcely sufficient, however, for home consumption is produced.

The list of fruits indigenous or cultivated in Siam includes those of tropical countries in general. This country is, however, especially distinguished for the excellence of its mangosteens and durians. There are a large number of different species and varieties of the orange, besides pine-apples, mangoes, guavas, and various fruits the produce of the forests, vying in delicacy with those cultivated in gardens.—*The Technologist.*

THE BRITISH PHARMACOPŒIA.

At a meeting of the General Council of Medical Education and Registration, held on Tuesday, July 2, the following Report of the Secretary of the Pharmacopœia Committee was read:—

" During the period which has elapsed since the meeting of the General Council of Medical Education and Registration in 1860, the three divisions of the Pharmacopœia Committee have persevered in their labours ; and the manuscript of the British Pharmacopœia is approaching completion, and will very shortly be ready for press, as will be seen in the following report, which, with the co-operation of Dr. Aquilla Smith, of the Dublin, and Dr. Charles Wilson, of the Edinburgh Committees, I am now enabled to lay before the Council:

" In order that the exact state of forwardness of the work may be correctly understood by the Council, it will be well to give a short sketch of its construction.

" It is divided into two parts, with an Appendix.

" Part I. contains a list of the Materia Medica, in which all the substances employed as medicines are inserted, and appended to each is its origin, with its definition, principal characters, tests for purity, and an enumeration of its officinal preparations.

" Part II. contains the various groups of Galenicals,—as extracts, infusions, tinctures, ointments, &c., with the methods of preparing each ; likewise the processes for making the numerous chemicals described in the first part of the work.

" The Appendix includes the substances employed, not as remedies, but only in their preparation ; and likewise the various test solutions to be used in ascertaining the strength and purity of drugs.

" One-third of the work has been allotted to each section of the Committee, and the portion framed by any one has been transmitted to the other two Committees, commented upon, and afterwards revised by the original Committee, and again recommented upon ; all undecided points are then reserved until the final general meeting of the delegates of the Pharmacopœia Committee.

" Part I. is necessarily the least complete, as a knowledge of all the preparations in Part II. is required before its final adjustment.

" Dr. Wilson thus reports from the Edinburgh Section:—'The list of the Materia Medica allotted to its share is nearly, if not altogether, complete, and will soon be transmitted to the other Committees;' and Dr. Aquilla Smith states, that 'De-

scriptions of the Drugs derived from the vegetable kingdom have been drawn up by the members of the Committee, but they cannot be completed until the Galenical Preparations are definitely settled and printed.' Professor Harvey, the Botanical Referee, is engaged in preparing his report, which will shortly be completed. Of the Chemical Preparations in the list of the Materia Medica, the formulas of the numerous preparations of iron have been printed in No. 8 of the Proceedings of the Committee, and circulated amongst the members of the three Branch Committees. The preparations of mercury were sent to Dr. Wilson, the secretary of the Edinburgh Committee, in April, 1861, and all the remaining chemical substances have been reported upon and approved of by the Committee.

"The London Committee has constructed its third of the list of the Materia Medica, as likewise nearly all the processes for the chemicals attached to that portion, and is now having a fair copy prepared for transmission to the other Committees.

" Part II. The three sections of the Committee have framed all the groups of Galenical Preparations; the whole have been commented upon, and most of them revised, and either transmitted or about to be immediately forwarded for final comments.

"It has been agreed by the three sections, that a General Meeting of Delegates from each shall be held in Edinburgh the first week in next September, in order to adjust any differences which may remain, and to make arrangements for the printing and publication of the work, which it may be reasonably hoped will be accomplished by the end of the present year.

" The Council will be enabled to appreciate the labour of compiling the *British Pharmacopœia*, and the cause of its somewhat tardy appearance, when it is stated that every preparation contained in the work has been made, often repeatedly, and each process practically examined; and it is the hope of the Committee that the *British Pharmacopœia* will be found worthy of the sanction and approval of the General Council.

"A. B. Garrod, M.D., F.R.S., *Secretary.*

" 84, Harley-street, Cavendish-square, July 1, 1861."

ON AN IMPROVED METHOD OF PREPARING SODÆ CARBONAS SICCATA.

BY HARRY NAPIER DRAPER, F.C.S.L.

The directions of the three British Pharmacopœias for the preparation of dried carbonate of soda are in almost every respect alike. Crystals of carbonate of soda are exposed to the action of heat until the whole of their water is dispelled. This process has two disadvantages. 1stly. The carbonate of soda of commerce, which is always used in practice to the exclusion of the pure product of the Pharmacopœias, invariably contains sulphates and chlorides. These are, of course, found also in the dry salt. 2ndly. The hard cake which results from the desiccation of the crystals is extremely difficult to powder, and never makes a really elegant preparation.

Both these inconveniences may be remedied by the substitution of *bicarbonate* of soda for the carbonate. When this salt is heated to redness, it, as is well known, loses one of its two equivalents of carbonic acid and all its water, a pure monocarbonate remaining. Bicarbonate of soda of commerce is nearly always almost pure, never, as far as my experience goes, containing more than slight traces of chlorides and sulphates. When not heated beyond redness, the resulting carbonate is not hard, but, on the contrary, is a loosely cohering perfectly white powder. The slight difference in the cost of carbonate and bicarbonate is of small moment when compared with the saving of time and trouble, and the superiority of the dried carbonate made from the latter salt.—*Dublin Medical Press.*

PHOTO-ZINCOGRAPHY.

The result of experiments made in photo-zincography, or the art of copying ancient manuscripts, or any other outline engravings, has been published by Colonel Sir Henry James, R.E., Director of the Ordnance Survey. The following is the description of the art:—

"By the term 'photo-zincography' is meant, as the name implies, the art of producing a photographic fac-simile of any subject—such as a manuscript, a map, or line engraving, and transferring the photograph to zinc, thereby obtaining the power of multiplying copies in the same manner as is done from a drawing on a lithographic stone or on a zinc plate.

"The first part of the process concerns the production of a negative photograph on glass of the document, of exactly the same size as the original. This is obtained by the ordinary wet collodion process, and too great care cannot be taken to obtain one as perfect as possible, as every defect will be transmitted through each step of the process till it affects the final result. As affecting success at this stage, the lens used should be as perfect as possible, and fully capable of projecting an image of the size required without sensible distortion. Lenses are used at the Ordnance Survey Office of various diameters, depending on the size of the document to be copied—the largest being 8 inches in diameter, 41 inches in principal focal length, and capable of producing negatives free from sensible distortion 16 inches square, a stop 1 inch in diameter being placed 8 inches in front of it.

"The distance from the lens to the ground-glass of the camera when adjusted so as to copy a subject in the same size is 7 feet 3 inches, and from the lens to the subject of course the same.

"The readiest means of adjusting the camera and lens in their proper position relatively to the object and to each other when it is required to produce a negative the same size, is to ascertain by actual measurement with a proper scale a lineal dimension of the subject (as its width or length), and so to regulate the distance of the lens from it, that when the image is focussed on the ground-glass it shall equal, in its corresponding dimension, that already read on the scale. This can easily be done by a system of repeated trial and correction of error. When the lens and camera are in adjustment, the glass plate is covered with the sensitive coating—exposed, developed, and fixed in the ordinary way; when fixed, it is immersed in a saturated solution of bichloride of mercury (corrosive sublimate). When well whitened by the action of the salt, it is removed, washed with water, and then with a solution of hydro-sulphate of ammonia, consisting of ten parts of water to one of hydro-sulphate of ammonia of commerce.

"In this manner the ground of the negative is rendered extremely dense, without affecting the clearness of the detail. When dried and varnished it is ready for use.

"We now come to the preparation of the sensitive paper. The quality of the paper used is a point of much importance. Various samples have been tried, but that which has been found best suited for the purpose is a semi-transparent kind, with a smooth surface, known by the name of engravers' tracing paper.

"The next step of the process is the coating of the whole surface of the print with an even and thin layer of a greasy ink, which is composed of the following ingredients:—

"Middle linseed-oil varnish, 4½ oz.; wax, 4 oz.; tallow, ½ oz.; Venice turpentine, ½ oz.; gum mastic, ¼ oz.; lamp black, 3½ oz.

"A portion of the above is dissolved in oil of turpentine, so as to make a solution of the consistency of thin cream, which is easily applied to the surface of the print with a brush.

"As soon as the lines are quite clear the print is placed in a flat dish and washed first with warm, and finally with cold water. When dry, it is ready for transferring to zinc or stone.

"There are two methods of transferring to zinc, varying according to the quantity of ink on the photograph.

"If a very small quantity has been applied on account of the closeness of the subject, the print is transferred by the 'anastatic' process."

ON THE PHYSICAL BASIS OF SOLAR CHEMISTRY.

BY JOHN TYNDALL, ESQ., F.R.S.

(*Delivered at the Royal Institution, Friday, June* 7, 1861.)

Omitting all preface, the speaker drew attention to an experimental arrangement intended to prove that gaseous bodies radiate heat in different degrees. Behind a double screen of polished tin was placed an ordinary ring gas-burner; on this was placed a hot copper ball, from which a column of heated air ascended: behind the screen, but so placed that no ray from the ball could reach the instrument, was an excellent thermo-electric pile, connected by wires with a very delicate galvanometer. The thermo-electric pile was known to be an instrument whereby heat was applied on the generation of electric currents; the strength of the current being an accurate measure of the quantity of the heat. As long as both faces of the pile were at the same temperature, no current was produced; but the slightest difference in the temperature of the two faces at once declared itself by the production of a current, which, when carried through the galvanometer, indicated by the deflection of the needle both its strength and its direction.

The two faces of the pile were in the first instance brought to the same temperature; the equilibrium being shown by the needle of the galvanometer standing at zero. The rays emitted by the current of hot air already referred to were permitted to fall upon one of the faces of the pile; and an extremely slight movement of the needle showed that the radiation from the hot air, though sensible, was extremely feeble. Connected with the ring-burner was a holder containing oxygen gas; and by turning a cock, a stream of this gas was permitted to issue from the burner, strike the copper ball, and ascend in a heated column in front of the pile. The result was, that oxygen showed itself, as a radiator of heat, to be quite as feeble as atmospheric air.

A second holder containing olefiant gas was also connected by its own system of tubes with the ring-burner. Oxygen had already flowed over the ball and cooled it in some degree. Hence, as a radiator in comparison with oxygen, the olefiant gas laboured under a disadvantage. It was purposely arranged that this should be the case; so that if, notwithstanding its being less hot, the olefiant gas showed itself a better radiator, its claim to superiority in this respect would be decisively proved. On permitting the gas to issue upwards, it cast an amount of heat against the adjacent face of the pile sufficient to impel the needle of the galvanometer almost to its stop at 90°. This experiment proved the vast difference between two equally transparent gases with regard to their power of emitting radiant heat.

The converse experiment was now performed. The thermo-electric pile was removed and placed between two cubes filled with water kept in a state of constant ebullition; and it was so arranged that the quantities of heat falling from the cubes on the opposite faces of the pile were exactly equal, thus neutralizing each other. The needle of the galvanometer being at zero, a sheet of oxygen gas was caused to issue from a slit between one of the cubes and the adjacent face of the pile. If this sheet of gas possessed any sensible power of intercepting the thermal rays from the cube, one face of the pile being deprived of the heat thus intercepted, a difference of temperature between its two faces would instantly set in, and the result would be declared by the galvanometer. The quantity absorbed by the oxygen under those circumstances was too feeble to affect the galvanometer; the gas, in fact, proved sensibly transparent to the rays of heat. It had but a feeble power of radiation: it had an equally feeble power of absorption.

The pile remaining in its position, a sheet of olefiant gas was caused to issue from the same slit as that through which the oxygen had passed. No one present could see the gas; it was quite invisible, the light went through it as freely as through oxygen or air; but its effect upon the thermal rays emanating from the cube, was what might be expected from a sheet of metal. A quantity so large was cut off, that the needle of the galvanometer, promptly quitting the zero line, moved with energy to its stops; thus the olefiant gas, so light and clear and pervious to luminous rays, was a most potent destroyer of the rays emanating from an obscure source. The reciprocity of action established in the case of oxygen comes out here; the good radiator is found by this experiment to be the good absorber.

This result, which was exhibited before a public audience this evening for the first time, was typical of what had been obtained with gases generally. Going through the entire list of gases and vapours in this way, we should find radiation and absorption to be as rigidly associated as positive and negative in electricity, or as north and south polarity in magnetism. The gas which, when heated, is most competent to generate a calorific ray, is precisely that which is most competent to stop such a ray. If the radiation be high, the absorption is high; if the radiation be moderate, the absorption is moderate; if the radiation be low, the absorption is low; so that if we make the number which expresses the absorptive power the numerator of a fraction, and that which expresses its radiative power the denominator, the result would be that, on account of the numerator and denominator varying in the same proportion, the value of that fraction would always remain the same, whatever might be the gas or vapour experimented with.

But why should this reciprocity exist? What is the meaning of absorption? what is the meaning of radiation? When you cast a stone into still water, rings of waves surround the place where it falls; motion is radiated on all sides from the centre of disturbance. When the hammer strikes a bell, the latter vibrates; and sound, which is nothing more than an undulatory motion of the air, is radiated in all directions. Modern philosophy reduces light and heat to the same mechanical category. A luminous body is one with its particles in a state of vibration; a hot body is one with its particles also vibrating, but at a rate which is incompetent to excite the sense of vision; and, as a sounding body has the air around it, through which it propagates its vibrations, so also the luminous or heated body has a medium, called ether, which accepts its motions and carries them forward with inconceivable velocity. Radiation, then, as regards both light and heat, is *the transference of motion from the vibrating body to the ether in which it swings*: and, as in the case of sound, the motion imparted to the air is soon transferred to the surrounding objects, against which the aërial undulations strike, the sound being, in technical language, *absorbed;* so also with regard to light and heat, absorption consists in *the transference of motion from the agitated ether to the particles of the absorbing body.*

The simple atoms are found to be bad radiators; the compound atoms good ones: and the higher the degree of complexity in the atomic grouping, the more potent, as a general rule, is the radiation and absorption. Let us get definite ideas here, however gross, and purify them afterwards by the progress of abstraction. Imagine our simple atoms swinging like single spheres in the ether; they cannot create the swell which a group of them united to form a system can produce. An oar runs freely edgeways through the water, and imparts far less of its motion to the water than when its broad flat side is brought to bear upon it. In our present language the oar, broad side vertical, is a good radiator; broad side horizontal, it is a bad radiator. Conversely the waves of water, impinging upon the flat face of the oar-blade, will impart a greater amount of motion to it than when impinging upon the edge. In the position in which the oar radiates well, it also absorbs well. Simple atoms glide through the ether without much resistance; compound ones encounter this, and yield up more speedily their motion to the ether. *Mix* oxygen and nitrogen mechanically, they absorb and radiate a certain amount. Cause these gases to *combine* chemically and form nitrous oxide, both the absorption and radiation are thereby augmented 250 times!

In this way we look with the telescope of the intellect into atomic systems, and obtain a conception of processes which the eye of sense can never reach. But gases and vapours possess a power of choice as to the rays which they absorb. They single out certain groups of rays for destruction, and allow other groups to pass unharmed. This is best illustrated by a famous experiment of Sir David Brewster's, modified to suit the requirements of the present discourse. Into a glass cylinder, with its ends stopped by discs of plate-glass, a small quantity of nitrous acid gas was introduced; the presence of the gas being indicated by its rich brown colour. The beam from an electric lamp being sent through two prisms of bisulphide of carbon, a spectrum seventeen feet long and eighteen inches wide was cast upon a screen. Introducing the cylinder containing the nitrous acid into the path of the

beam as it issued from the lamp, the splendid and continuous spectrum became instantly furrowed by numerous dark bands, the rays answering to which were struck down by the nitric gas, while it permitted the light which fell upon the intervening spaces to pass with comparative impunity.

Here also the principle of reciprocity, as regards radiation and absorption, holds good; and could we, without otherwise altering its physical character, render that nitrous gas luminous, we should find that the very rays which it absorbs are precisely those which it would emit. When atmospheric air and other gases are brought to a state of intense incandescence by the passage of an electric spark, the spectra which we obtain from them consist of a series of bright bands. But such spectra are produced with the greatest brilliancy when, instead of ordinary gases, we make use of metals heated so highly as to volatilize them. This is easily done by the voltaic current. A capsule of carbon was filled with mercury, which formed the positive electrode of the electric lamp; a carbon point was brought down upon this; and on separating one from the other, a brilliant arc containing the mercury in a volatilized condition passed between them. The spectrum of this arc was not continuous like that from the solid carbon points, but consisted of a series of vivid bands, each corresponding in colour to that particular portion of the spectrum to which its rays belonged. Copper gave its system of bands; zinc gave its system; and brass, which is an alloy of copper and zinc, gave a splendid spectrum made up of the bands belonging to both metals.

Not only, however, when metals are united like zinc and copper to form an alloy, is it possible to obtain the bands which belonged to them. No matter how we may disguise the metal—allowing it to unite with oxygen to form an oxide, and this again with an acid to form a salt; if the heat applied be sufficiently intense, the bands belonging to the metal reveal themselves with perfect definition. Holes were drilled in a cylinder of retort carbon, and these being filled with pure culinary salt, the carbon was made the positive electrode of the lamp: the resultant spectrum showed the brilliant yellow lines of the metal sodium. Similar experiments were made with the chlorides of strontium, calcium, lithium,* and other metals; each salt gave the bands due to the metal. Different salts were then mixed together, and rammed into the holes in the carbon; a spectrum was obtained which contained the bands of them all.

The position of these bright bands never varies, and each metal has its own system. Hence the competent observer can infer from the bands of the spectrum the metals which produce it. It is a language addressed to the eye instead of the ear: and the certainty would not be augmented if each metal possessed the power of audibly calling out, "I am here!" Nor is this language affected by distance. If we find that the sun or the stars give us the bands of our terrestrial metals, it is a declaration on the part of these orbs that such metals enter into their composition. Does the sun give us any such intimation? Does the solar spectrum exhibit bright lines which we might compare with those produced by our terrestrial metals, and prove either their identity or difference? No. The solar spectrum, when closely examined, gives us a multitude of fine dark lines instead of bright ones. They were first noticed by Dr. Wollaston, were investigated with profound skill by Fraunhofer, and named from him Fraunhofer's lines. They have been long a standing puzzle to philosophers. The bright lines which the metals give us have been also known to us for years; but the connexion between both classes of phenomena was wholly unknown, until Kirchhoff, with admirable acuteness, revealed the secret, and placed it at the same time in our power to chemically analyze the sun.

We have now some hard work before us; hitherto we have been delighted by objects which addressed themselves rather to our æsthetic taste than to our scientific faculty. We have ridden pleasantly to the base of the final cone of Etna, and must now dismount and march wearily through ashes and lava, if we would enjoy the

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* The vividness of the colours of the lithium spectrum is extraordinary: it contained a blue band of indescribable splendour. It was thought by many, during the discourse, that I had mistaken strontium for lithium, as this blue band had never before been seen. I have obtained it many times since; and my friend, Dr. Miller, having kindly analyzed the substance made use of, pronounces it chloride of lithium.—J. T.

prospect from the summit. Our problem is to connect the dark lines of Fraunhofer with the bright ones of the metals. The white beam of the lamp is refracted in passing through our two prisms, but its different components are refracted in different degrees, and thus its colours are drawn apart. Now the colour depends solely upon the rate of oscillation of the particles of the luminous body; red light being produced by one rate, blue light by a much quicker rate, and the colours between red and blue by the intermediate rates. The solid incandescent coal-points give us a continuous spectrum; or, in other words, they emit rays of all possible periods between the two extremes of the spectrum. They have particles oscillating so as to produce red; others, to produce orange; others, to produce yellow, green, blue, indigo, and violet respectively. Colour, as many of you know, is to light what *pitch* is to sound. When a violin-player presses his finger on a string he makes it shorter and tighter, and thus, causing it to vibrate more speedily, augments the pitch. Imagine such a player to move his finger slowly along the string, shortening it gradually as he draws his bow, the note would rise in pitch by a regular gradation; there would be no gap intervening between note and note. Here we have the analogue to the continuous spectrum, whose colours insensibly blend together without gap or interruption, from the red of the lowest pitch to the violet of the highest. But suppose the player, instead of gradually shortening his string, to press his finger on a certain point, and to sound the corresponding note; then to pass on to another point, more or less distant, and sound its note, then to another, and so on, thus sounding particular notes separated from each other by gaps which correspond to the intervals of the string passed over; we should then have the exact analogue of a spectrum composed of separate bright bands with intervals of darkness between them. But this, though a perfectly true and intelligible analogy, is not sufficient for our purpose; we must look with the mind's eye at the very oscillating atoms of the volatilized metal. Figure these atoms connected by springs of a certain tension, and which, if the atoms are squeezed together, push them asunder, or if the atoms are drawn apart, pull them together, causing them, before coming to rest, to quiver at a certain definite rate determined by the strength of the spring. Now the volatilized metal which gives us one bright band is to be figured as having its atoms united by springs all of the same tension, its vibrations are all of one kind. The metal which gives us two bands may be figured as having some of its atoms united by springs of one tension, and others by a second series of springs of a different tension. Its vibrations are of two distinct kinds; so also when we have three or more bands, we are to figure as many distinct sets of springs, each set capable of vibrating in its own particular time and at a different rate from the other. If we seize this idea definitely, we shall have no difficulty in dropping the metaphor of springs, and substituting for it mentally the forces by which the atoms act upon each other. Having thus far cleared our way, let us make another effort to advance.

Here is a pendulum,—a heavy ivory ball suspended from a string. I blow against this ball; a single puff of my breath moves it a little way from its position of rest; it swings back towards me, and when it reaches the limit of its swing I puff again. It now swings further; and thus by timing my puffs I can so accumulate their action as to produce oscillations of large amplitude. The ivory ball here has absorbed the motions which my breath communicated to the air. I now bring the ball to rest. Suppose, instead of my breath, a wave of air to strike against it, and that this wave is followed by a series of others which succeed each other exactly in the same intervals as my puffs; it is perfectly manifest that these waves would communicate their motion to the ball and cause it to swing as the puffs did. And it is equally manifest that this would not be the case if the impulses of the waves were not properly timed; for then the motion imparted to the pendulum by one wave would be neutralized by another, and there could not be that accumulation of effect which we have when the periods of the waves correspond with the periods of the pendulum. So much for the kinds of impulses absorbed by the pendulum. But such a pendulum set oscillating in air produces waves in the air; and we see that the waves which it produces must be of the same period as those whose motions it would take up or absorb most copiously if they struck against it. Just in passing I may remark, that if the periods of the waves be double, treble, quadruple, &c., the periods of the pendulum, the

shocks imparted to the latter would also be so timed as to produce an accumulation of motion.

Perhaps the most curious effect of these timed impulses ever described was that observed by a watchmaker, named Ellicott in the year 1741. He set two clocks leaning against the same rail; one of them, which we may call A, was set going; the other, B, not. Some time afterwards he found, to his surprise, that B was ticking also. The pendulums being of the same length the shocks imparted by the ticking of A to the rail against which both clocks rested were propagated to B, and were so timed as to set B going. Other curious effects were at the same time observed. When the pendulums differed from each other a certain amount, A set B going, but the re-action of B stopped A. Then B set A going, and the re-action of A stopped B. If the periods of oscillation were close to each other, but still not quite alike, the clocks mutually controlled each other, and by a kind of mutual compromise they ticked in perfect unison.

But what has all this to do with our present subject? They are mechanically identical. The varied actions of the universe are all modes of motion; and the vibration of a ray claims strict brotherhood with the vibrations of our pendulum. Suppose ethereal waves striking upon atoms which oscillate in the same periods as the waves succeed each other, the motion of the waves will be absorbed by the atoms; suppose we send our beam of white light through a sodium flame, the particles of that flame will be chiefly affected by those undulations which are synchronous with their own periods of vibration. There will be on the part of those particular rays a transference of motion from the agitated ether to the atoms of the volatilized sodium, which, as already defined, is absorption. We use glass screens to defend us from the heat of our fires; how do they act? Thus:—The heat emanating from the fire is for the most part due to radiations which are incompetent to excite the sense of vision; we call these rays obscure. Glass, though pervious to the luminous rays, is opaque in a high degree to those obscure rays, and cuts them off, while the cheerful light of the fire is allowed to pass. Now mark me clearly. The heat cut off from your person is to be found in the glass, the latter becomes heated and radiates towards your person; what then is the use of the glass if it merely thus acts as a temporary halting-place for the rays, and sends them on afterwards? It does this:—It not only sends the heat it receives towards you, but scatters it also in all other directions round the room. Thus the rays which, were the glass not interposed, would be shot directly against your person, are for the most part diverted from their original direction, and you are preserved from their impact.

Now for our experiment. I pass the beam from the electric lamp through the two prisms, and the spectrum spreads its colours upon the screen. Between the lamp and the prism I interpose this snapdragon light. Alcohol and water are here mixed up with a quantity of common salt, and the metal dish that contains them is heated by a spirit-lamp. The vapour from the mixture ignites, and we have this monochromatic flame. Through this flame the beam from the lamp is now passing; and observe the result upon the spectrum. You see a dark band cut out of the yellow,—not very dark, but sufficiently so to be seen by everybody present. Observe how the band quivers and varies in shade as the amount of yellow light cut off by the unsteady flame varies in amount. The flame of this monochromatic lamp is at the present moment casting its proper yellow light upon that shaded line; and more than this, it casts, in part, the light which it absorbs from the electric lamp upon it; but it scatters the greater portion of this light in other directions, and thus withdraws it from its place upon the screen, as the glass, in the case above supposed, diverted the heat of the fire from your person. Hence the band appears dark, not absolutely, but dark in comparison with the adjacent brilliant portions of the spectrum.

But let me exalt this effect. I place in front of the electric lamp the intense flame of a large Bunsen's burner. I have here a platinum capsule into which I put a bit of sodium less than a pea in magnitude. The sodium placed in the flame soon volatilizes and burns with brilliant incandescence. Observe the spectrum. The yellow band is clearly and sharply cut out, and a band of intense obscurity occupies its place. I withdraw the sodium, the brilliant yellow of the spectrum takes its proper place; I re-introduce the sodium, and the black band appears.

Let me be more precise:—The yellow colour of the spectrum extends over a sensible space, blending on one side into orange, and on the other into green. The term "yellow band" is therefore somewhat indefinite. I want to show you that it is the precise yellow band emitted by the volatilized sodium which the same substance absorbs. By dipping the coal-point used for the positive electrode into a solution of common salt, and replacing it in the lamp, I obtain that bright yellow band which you now see drawn across the spectrum. Observe the fate of that band when I interpose my sodium light. It is first obliterated, and instantly that black streak occupies its place. See how it alternately flashes and vanishes as I withdraw and introduce the sodium flame!

And supposing that instead of the flame of sodium alone, I introduce into the path of the beam a flame in which lithium, strontium, magnesium, calcium, &c., are in a state of volatilization, each metallic vapour would cut out its own system of bands, each corresponding exactly in position with the bright band which that metal itself would cast upon the screen. The light of our electric lamp then shining through such a composite flame would give us a spectrum cut up by dark lines, exactly as the solar spectrum is cut up by the lines of Fraunhofer.

And hence we infer the constitution of the great centre of our system. The sun consists of a nucleus which is surrounded by a flaming atmosphere. The light of the nucleus would give us a continuous spectrum, as our common coal-points did; but having to pass through the photosphere, as our beam through the flame, those rays of the nucleus which the photosphere can itself emit are absorbed, and shaded spaces, corresponding to the particular rays absorbed, occur in the spectrum. Abolish the solar nucleus, and we should have a spectrum showing a bright band in the place of every dark line of Fraunhofer. These lines are therefore not absolutely dark, but dark by an amount corresponding to the difference between the light of the nucleus intercepted by the photosphere, and the light which issues from the latter.

The man to whom we owe this beautiful generalization is Kirchhoff, Professor of Natural Philosophy in the University of Heidelberg; but, like every other great discovery, it is compounded of various elements. Mr. Talbot observed the bright lines in the spectra of coloured flames. Sixteen years ago Dr. Miller gave drawings and descriptions of the spectra of various coloured flames. Wheatstone, with his accustomed ingenuity, analyzed the light of the electric spark, and showed that the metals between which the spark passed determined the bright bands in the spectrum of the spark. Masson published a prize essay on these bands; Van der Willigen, and more recently Plücker, have given us beautiful drawings of the spectra, obtained from the discharge of Ruhmkorff's coil. But none of these distinguished men betrayed the least knowledge of the connexion between the bright bands of the metals and the dark lines of the solar spectrum. The man who came nearest to the philosophy of the subject was Angström. In a paper translated from Poggendorff's *Annalen* by myself, and published in the *Philosophical Magazine* for 1855, he indicates that the rays which a body absorbs are precisely those which it can emit when rendered luminous. In another place he speaks of one of his spectra giving the general impression of *reversal* of the solar spectrum. Foucault, Stokes, and Thomson, have all been very close to the discovery; and, for my own part, the examination of the radiation and absorption of heat by gases and vapours, some of the results of which I placed before you at the commencement of this discourse, would have led me in 1859 to the law on which all Kirchhoff's speculations are founded, had not an accident withdrawn me from the investigation. But Kirchhoff's claims are unaffected by these circumstances. True, much that I have referred to formed the necessary basis of his discovery; so did the laws of Kepler furnish to Newton the basis of the theory of gravitation. But what Kirchhoff has done carries us far beyond all that had before been accomplished. He has introduced the order of law amid a vast assemblage of empirical observations, and has ennobled our previous knowledge by showing its relationshlp to some of the most sublime of natural phenomena.

CORRESPONDENCE RELATING TO THE PROGRESS OF THE SOCIETY.

The object of publishing this correspondence is to afford Members of the Society the means of expressing their opinions on a subject with reference to which it is desirable to ascertain what the prevalent opinion is. Correspondents are requested to make their communications as brief as possible, to confine themselves to the points in question, and to avoid, as far as possible, personal allusions. It has been found necessary to omit some communications, and to abridge others, in which these conditions have not been observed.—Ed. Pharm. Journ.

TO THE EDITORS OF THE PHARMACEUTICAL JOURNAL.

Gentlemen,—The proposed change in the Bye-laws of our Society having awakened a lively interest among its Members, and a further expression of opinion being still invited, I beg to record my protest against the proposed interference with the fundamental principles of the Society, as being subversive of its best interests, incompatible with its future development and progress, and a false method of meeting a temporary difficulty.

The arguments adduced in favour of the change I am inclined to regard with feelings analogous to those which Bassanio is supposed to have evinced towards the golden caskets, and to regard their glittering exterior as

"But the guilèd shore to a most dangerous sea."

That there are men outside the pale of our Society who stand high in public estimation, conduct flourishing and important businesses, and upon whom a discriminating public has stamped the seal of intelligence, ability, and honour, no one is prepared to deny; but my own observations and experience lead me to believe that the number of these has been considerably overrated, that the cases are isolated, and that, with comparatively few exceptions, the men who justly lay claim to superiority are those in whose collection of fine arts are to be found the imaginary portraits of Galen and Avicenna.

How, I would ask, in the name of all that is just and honourable, can the Board of Examiners sit at 17, Bloomsbury Square, and reject a candidate if he should not be found to be lucid on the theory of cell development, or if his views of the homologous series are scarcely *à la* Fownes, and at the same time extend the right hand of fellowship to those who refused to enter when the door was open, and who now wish for a royal road to be opened for them?

That every Member who cherishes a spark of manly pride in his Society, and is anxious for its influence to become extended, its appeal to public confidence merited, and its "*Habeat ratio valetudinis*" handed down intact to generations of Pharmaceutists yet unborn, will give his unqualified opposition to this undignified course, I cannot for one moment doubt.

I regret, Sirs, it should ever have been our duty to protest against such a dangerous innovation of our established rights, privileges, and position, as it must inevitably go forth to the world as a sign of internal weakness and degeneracy.

I am, Gentlemen, yours respectfully,

Kettering, July 18th, 1861. D. Watson.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—I have only a few words to say.

I would give the Council of the Pharmaceutical Society full power to admit every Druggist who has served an apprenticeship to the trade. I do not think there are many old Druggists who would join the Society, if it costs them five pounds to obtain the honour of affixing M.P.S. to their—now well known—names; for as their days have passed, so they will end.

If any are allowed to join the Society without examination, let there be no limit: every Chemist has an equal right. The *majority* of Pharmaceutical Chemists have become members of the body corporate without a certificate—*they* cannot complain; the minority are fully secured, and will not forget to keep their friends well aware

of the distinction; but, as no one appears to have suggested an alteration of the title, I would ask whether *F.*P.S., or Fellow of the Pharmaceutical Society, would not set aside any doubt about the examined Members' status. I would therefore ask the Council to give every man his due—add as many "*Members*" to the Society as possible, but no "*Fellows*" without undergoing the usual examinations.

I am, Sir, yours obediently,

Wetherby, July 3rd, 1861. JAMES HOULTON.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—I beg to offer a few remarks upon the proposed changes in the Bye-laws of the Pharmaceutical Society.

Several correspondents have already favoured us with reasons for and against the occasional opening of the doors of the Society to admit upon easy terms such Chemists and Druggists as seemed to have any claim to such a privilege. Like most others, I have given some thought to the subject; but with me the consideration has not been whether this occasional opportunity were right, but rather whether it ever was right to throw any obstacle in the way of those joining our ranks who were "Chemists before the Act."

Though I have contributed to the funds of the Society for sixteen years, and hold my membership by examination, I would be far from wishing to exclude any of my fellow-tradesmen from the privileges of the position which I have so long enjoyed. I do not consider that I would be the poorer, or my position the less honourable, if all Chemists before the Act were registered Pharmaceutists.

If there is a fault to be found with the proposition now before the Society, I think it is that the scheme is yet too narrow. If a change is to be made let it be of such breadth as will be fit foundation for a substantial superstructure. Though a change may be *suggested* by the *present* circumstances, it should be made to *provide* for the *future*, and be based upon our experience of the past. It would be a pity to make a change to suit the present; the present will soon become the past, when another change will be required. This is too much what has been done already. I say it without imputing any blame to those who have held the reins, or those who are now proposing to carry us another stage onward. One stage cannot bring us to a place of rest. Our journey must be a long, if not an endless, one; and our present doings can only be satisfactory when they have a judicious regard for our future progress.

What, then, are the desiderata of such importance as to warrant a constitutional change?

First. Let the country Members be fairly and fully represented in the Council, by having the country divided into districts, each sending its representative to the Council. For example, let England be divided into S.E., S.W., E.C., W.C., N.E., N.W., and Scotland into S.E., S.W., and N., which would give nine country Members of Council, and leave a large preponderance still to be elected from the London Members, which, of course, is necessary for the efficient and economical working of the Society.

Second. Let the minor examinations be facilitated by entrusting them to the Members in the district where the candidate resides; for example, let any two examined Members have the power to grant a certificate of classical qualification to a youth entering his studentship. Let each district have a board of examiners, consisting of examined Members, aided, if necessary, by professional assistance. These boards for the present to have power to conduct the minor examinations only, but in the event of a compulsory Act coming into operation to have also the power of granting licences in Pharmacy; the central boards alone having the power of granting the higher degree of M.P.S.

The chief advantages which I anticipate would arise out of these changes would be a more thorough examination of the students previous to registration (for, as at present conducted in the provinces, the classical examination is far from satisfactory), and an increase in the number of minor graduates consequent upon saving the time and money now spent in going to London or Edinburgh. Also, because they would feel it less formidable to present themselves to their fellow-townsmen or gentlemen of whom they had some personal knowledge.

An increase in major graduates would be the natural result of the increase in the lower grade, both from the greater interest which would be felt in the Society con-

sequent upon their having gone so far, and from the encouragement which would be felt to present themselves for a second examination after having been successful in the first. Supposing these results to follow, a great step would have been taken in increasing the stability and utility of the Society.

With regard to providing additional income, I think it would be best to trust to the increased number of annual subscriptions, or the voluntary purchase of life membership. If any considerable entrance fee and an annual subscription be required before a member of the trade can be admitted to the Society, we may wait long enough without increasing our numerical strength or our financial resources.

What would be thought of the subject in a commercial point of view? Would any one think of charging for admittance to his shop and expect to find customers willing to enter, *even if they were sure to get a good pennyworth when once within the door?* Or could any one expect a fee from his customers for allowing them to open accounts with him? It is objected that we have been paying for many years to build up a position, and it is argued that they will receive the advantages of that position immediately upon entering it. And why should they not? I am only sorry that we have so little to offer the "outsiders" as an inducement to enter. I do not know any advantage they would have but such as we have been receiving ever since we commenced to pay our subscriptions.

If a literary institution be established, the founders always have most to pay and least to receive, but, as time goes on, books and other properties accumulate, yet that is not considered a reason for subsequent members paying higher subscriptions, or heavy entrance fees; but there would be more reason for their doing so than for us. So long as we grudge to others the benefit of any little advantages we may possess, or appear to throw any obstacles in the way of their enjoying the same, or seem to despise them for a supposed inferiority—so long as we do thus, we are earning their ill-feeling and opposition. Such petty jealousies are formidable obstacles to that which would be so desirable to all parties—an Act to regulate the qualifications of dispensers of medicines and dealers in drugs and poisons.

If any gentleman feels himself degraded by being placed upon the same level with those who are admitted to the Society because they are assumed to be competent to carry on the business of Pharmaceutical Chemists, it would be most desirable to open to him a higher distinction, say the title of F.P.S., on his contributing to the art or science of Pharmacy or Materia Medica such new facts as the Council considered a benefit to the community at large.

11, *Grey St., Newcastle-on-Tyne, July 1st*, 1861. BARNARD S. PROCTOR.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—Having read with much interest the various articles in the Journal on the future of our Society, and being one of its first Members, I beg to add a few of my thoughts on the subject.

My opinion is, that we are not progressing; when a tradesman is doubtful on which side the balance of stock taking will be, it is pretty sure to prove on the wron gside. I also think we are not likely to progress without a fresh Act of Parliament, and one which will do more than distinguish between tweedle-dum and tweedle-dee, *i.e.* between "Pharmaceutical" and "Dispensing" Chemist.

Now that we have all the machinery complete for turning out competent Pharmaceutists, what we want is a *patent* for their manufacture, such as the medical, legal, and clerical professions possess for the exclusive manufacture of their articles; and if we can show that certain qualifications are necessary for dispensers, and that these cannot be known to exist without examination, I think we may gain our object, though, perhaps, after several failures. As the register would include all the Chemists now in business, it would injure no existing interests, and if future candidates were still allowed to gain their knowledge where they pleased, but were obliged to prove by examination that they had gained it, there would be no exclusiveness in the act.

The proposed re-opening of the door of our Society seems to me an unjust and timid policy, and likely to prove a failure, because I believe *very few* will be found willing to pay five guineas at entrance and the annual subscription; but this can

soon be ascertained if the Secretary send circulars to all the trade, as soon as the Council have settled the terms of the proposed admission.

I would gladly sink all my past payments, and even the Society itself, if we could secure for our trade an acknowledged professional standing, and compulsory registration and examination. Without this, many whom we have enabled to gain a scientific education will leave *shopkeeping* to the "outsiders," and the "insane competition" will increase. I am, yours truly,

Swansea, July 8th, 1861. 1841.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—There is no disguising the fact that the Pharmaceutical Society has arrived at an important and critical period of its history. That it was established, in the first instance, for the benefit of the *whole body* of Druggists in the kingdom—that it has really accomplished much for them, and would have done more had not large numbers of respectable Chemists stood aloof from its connexion—no honest man ought to deny, as the facts are beyond all contradiction. But it is now equally clear to any man of the least penetration, that the Society must take a bold stand upon *what it has already accomplished*, and a decided forward movement without delay, to secure a further and more complete legal enactment, in which injustice must be done to none; but our first object must be obtained, otherwise the divisions and stupid and selfish opposition, which are springing up within and without, will probably end in the defeat of the only measures which can save us from disruption.

I have ever considered that a more liberal and conciliatory policy should have been adopted by the Pharmaceutical Society, and I know of numerous letters having been written to the late Jacob Bell, of respected memory, on this subject, which were only noticed by a private and polite note acknowledging their receipt, without in any form giving publicity to the sentiments contained in them.

As an individual, I do not see any other way of repairing this one error of Mr. Bell's policy, than by admitting all the really deserving Chemists in the kingdom who were in business prior to the institution of examinations, to unite with us and make a decisive effort to accomplish our first object. By doing no injustice to those who will still be separated from us, but who will participate in the benefit, we shall disarm them from any shadow of excuse for continued opposition, and their conduct will be manifestly unreasonable and suicidal. I do not see that the examined Members will have any just cause to complain; they will still have their certificates, which now distinguish them honourably and favourably from other Members; and not one iota of the principle on which they were admitted will be sacrificed, nor would I advocate the slightest departure from this principle—examination of all Members not in business when examination was instituted. That we can perpetuate our Society, and still send out superior Pharmaceutists into the trade, without any attempt at a general enactment, I do not doubt; but I maintain that this was not the original object for instituting the Society, which was for the benefit of the whole body of Druggists in the kingdom.

I am, Sir, yours truly,

Liverpool, July 18th, 1861. JOSEPH BALL.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—Will you kindly allow me space in your columns for a few remarks, to which, as a Major Associate, I feel I am entitled.

The question of progression has been pretty fully discussed by various correspondents, and I think most of them agree on one point—viz. that hitherto the *Society* has progressed quite equal to expectations, and that the qualified Pharmaceutical Chemist is beginning to take that position in society which is his just due. However much we may have progressed, there yet remains very much to be accomplished, but if we still persevere, I feel sure our efforts will be crowned with ultimate success.

I quite agree with a Fellow Associate in his letter last month as to the cause of the still somewhat degraded position of the business of Chemist and Druggist, and until we obtain an Act for the compulsory examination of all Chemists previous to commencing business, this evil will exist.

Much as "progression" appears to be the motto of most of the Members and Associates of our Society, I am sorry to see that our Council are evidently bent on going backward, and commencing the work over again. They wish again to throw open the portals, to break down the barrier which now exists between the so-called Chemist and Druggist and the qualified Pharmaceutist, and to again make them one body by admitting a number of Druggists as Members of our Society without passing the examinations prescribed by the Council. These newly-made Members will be allowed to express opinions at the General Meeting, vote for Members of the Council, and many other privileges which we (Major Associates, who have given up a great deal of time and money in order to qualify ourselves as Members) are not allowed. Is this fair to ourselves, I will ask? Is it just to the Society at large?

There are, I know, many who call themselves Chemists, who would gladly become members of our Society, but who would be a perfect disgrace to us.

The Society and its Members are now beginning to be better appreciated by the public generally, and I consider it would be extremely unwise to again admit a number of unqualified men as Members, for I feel convinced it would in a great measure shake the confidence of the public, and would act most prejudicially against the interests of the Society generally. How many young men, I wonder, will trouble to qualify themselves for the examinations, if every eight or ten years they may be admitted as Members by merely paying an annual subscription of a guinea? Will the extra knowledge they acquire compensate them for their loss of time and money in so qualifying? And will the extra knowledge be sufficient inducement? I fear not.

I very much question the statement of Mr. E. R. Hornby, with regard to its being a wise act on the part of the Council. It may be a liberal one to those who are not connected with the Society, but I will ask, Is it just to those who have spent their time and money in qualifying for the examinations, and on whom the future welfare of the Society so much depends? The Council should recollect the old maxim, "Be *just* before you are generous."

If means are required for increasing the income of the Society, let the fees be raised, and let us also endeavour, without delay, to obtain the necessary Act of Parliament for compulsory examinations. Could we not get up a petition from the public to Parliament? and could we not induce some influential member of the House to take up the subject, which is one of so great importance to the safety of the public? If so, the difficulty of obtaining the Act is rather apparent than real. If an Act could be obtained, there would be a far greater number of young men presenting themselves for the examinations, and, consequently, the income of the Society would thereby be considerably increased. At present, I do not suppose one half of the young men who commence business trouble to qualify themselves as Members of our Society.

On the other hand, if the proposed alteration be made, I can only say for myself (and I think I shall at the same time express the opinion of most of the Associates), that I shall decline taking up my membership, as I shall not think it worth spending another £5 5s. for that which now appears to be no honour.

I am, Sir, yours obediently,

Atherstone. E. P.

TO THE EDITORS OF THE PHARMACEUTICAL JOURNAL.

GENTLEMEN,—It appears very desirable that the opinions of individual Members should be expressed in the present crisis of the affairs of the Pharmaceutical Society, and especially so that *we* who have obtained our membership by examination should speak out in reference to the proposal to admit a number of new Members without such educational test. No doubt it would be a very pleasant sort of thing to add some 200 or 300 new Members to the Society, each to pay an entrance fee of five guineas and the usual annual subscription, and all men of position and respectability; and if this could be done without injustice to others, and without damaging the position and influence of the Society, all its well-wishers would rejoice.

But, Sirs, in common with many others, I feel that such a gain would be the greatest loss the Society could well sustain, that the hitherto gratifying progress of the Society would receive a check from which it would be years in recovering, if, in

fact, it did so at all before the march of events had completely altered the aspect of the question.

First, of the injustice of the scheme. That it would be unjust to the original Members is very apparent to those who paid and worked at the establishment of the Society, who lent their efforts and their influence to give it a position, and all with but a slender hope of any real return. It is most unfair that now, when the Society has become by their money and wisdom a valuable institution, commanding the respect of the medical profession, the public, and the Government, that they should find themselves only in the position of those who cautiously kept aloof, closed their pockets, and withheld their influence when appealed to for help, and left the Society to establish itself as best it could. Truly, Sirs, if this be the result, it will be a triumph for the cautious and the prudent man.

But the injustice to those who have obtained their membership by examination is greater still. It may show a miserly spirit to bring everything to a money test, but one cannot help it here. Laying aside the labour and study, now many young men have expended £40 to £60 or more in obtaining their "pretty picture?" They have found laboratory fees, apparatus, books, board and lodging, make demands on their purses which have called for the greatest self-denial and economy to enable them to meet them; but, the prize gained, they have entered on business strengthened by the conviction that they have done all in their power to qualify themselves for its exercise, and on that ground confidently appeal to the public for support. And now what does the Society propose to give them as a reward? To make their position virtually the same as that of reticent outsiders who are now willing to pay a paltry five guineas to our needy Society. How many young men would have kept aloof had they foreseen this result to their labours? and how many more will keep aloof when they find that the Society has once broken faith with its professions, and will fairly suppose that the restrictions once relaxed may be so again and again when money and Members are wanted? The noble laboratories in Bloomsbury Square will have been constructed to no purpose, they will be deserted and empty.

If the scheme be persisted in and carried out, many examined Members will become "secessionists," feeling that a too credulous public fails to appreciate the difference in value of the "pretty picture" in different shops, and to appeal to the certificates of examination would, I feel, avail but little better.

So then, without great injustice to the present Members of the Society, this scheme cannot be carried out; and if we look to the probable effect on the Society generally, the objections are equally great. It will soon be understood that the Pharmaceutical Society, which has talked so much about the value of its examinations as a test of efficiency and a ground for confidence on the part of the public, is not true to its professions; that it has taken a retrograde step; that for the sake of a five-guinea fee it will be silent about education; and, if a man has only been in business long enough, will receive him into its membership, and send him forth to the public with such prestige as the Society can give.

The inevitable result will be, the profession and the public will cease to have any confidence in the Society, it will be numbered with the many shams of the day; and if, as some would have us think, we are now drawing near to that long hoped-for consummation, a compulsory Act, we may rest assured that such a loss of public confidence in the Society will postpone it indefinitely. The plausible argument that we ought to have those "outside" good men and true (though it is wonderful how suddenly their great goodness has been discovered) on our register before a compulsory Act is obtained, seems of little weight. The ground on which we may hope for success on any application the Society may make for such an Act must be that the Members of the Society are educated men fully up to their calling, and men who have done their best to raise the position of Pharmacy in this country.

Should such an Act now be obtained, some arrangement must then be made for these outsiders, and that will be the proper time, but it would be folly, indeed, for the Society in the mean time to weaken its position and damage its reputation by their admission.

In review then of all the circumstances, it is evident this scheme is most objectionable. Its adoption involves injustice to the present Members, a loss of public confidence in the Society, indefinite postponement of effective legislation, and an hindrance to the Society's future progress.

And all this is to be risked for what? Simply for the sake of a little money, that is the real reason; but for the want of funds we should have heard nothing of the proposition, and the great value of these outsiders would have remained undiscovered. The present system of fees is said to be insufficient for the future wants of the Society. What more simple, then, than a return to the annual subscriptions which have heretofore been found amply sufficient to maintain and advance the Society, especially if, as Mr. Hornsby suggests, it be combined with a reduced admission fee.

I am, &c.,

Christchurch. W. JUDD.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—Seeing by your Journal that a change is likely to be made in the Bye-laws with respect to the admission of those connected with the business prior to the passing of the Act, and who did not avail themselves of the privilege offered them by the Society at that time, I for one should become a candidate for admission into the Society, provided such a change should be carried into effect. I lately held the appointment of dispenser at St. Bartholomew's Hospital, and I hold a certificate of qualification in dispensing, by examination before the Court of Examiners of the Society of Apothecaries, London; and my reason in offering myself as a candidate for admission into your Society is from a firm conviction of the usefulness of your Society, and the support which it ought to claim from the Chemists and Druggists at large. My apprenticeship expired before 1852, and I should then have connected myself with the Society, but was prevented doing so in consequence of certain objections raised against the Society by the individual I was then living with, who had been a member of the Society and had estranged himself from it.

I am, Sir, yours obediently,

Bungay, July 4th, 1861. WALTER F. PARKWAY.

SIR,—I feel it imperative to enter my protest against the proposed alteration of the Bye-laws. Being an outsider before 1857, and finding it no use kicking against the pricks, I resolved to pass the examinations of the Society, which I did, after the usual study and expense. Let others do the same, and I'll guarantee they will never regret it; and those that will not take the trouble must come short of the glory of Pharmacy.

London. F. M.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—The question of altering the Bye-laws of the Society, which is now under the consideration of the Council, in order to admit Members without examination, requires the attention not only of the Members of the Society who are in business, but also of those who, by passing the examinations, have qualified themselves for commencing business so soon as opportunity affords; and as one of these, and one, moreover, who takes great interest in the Society and its welfare, I venture to offer a few remarks.

I for one have been at great expense in working in the laboratory of the Society and in passing its examinations, and I speak also for many who have done likewise, when I say that if any alteration of the Bye-laws can be made so as to admit respectable and competent non-members "*who were in business before* 1852" (the year of the passing of the Act) into the Society, as far as the broad principle of the alteration is concerned it will be of benefit to us, and in so doing I think we shall not be called upon to part with any of our dignity as Members by examination, nor shall we be required to put ourselves on a par with men of our own age and stamp who have not passed through a like ordeal; and I think, Sir, that we who have expended time and money in passing the examinations, but which nevertheless "*we not for a moment grudge, nor would exchange if we could for what we have gained in return*"—we, I say, ought to be those among the first to complain, if any. Of course, the alteration should be subject to some such provisions as suggested by some of your correspondents, Mr. Groves, An Associate (Wilton), &c., as the Council might think fit. I think, too, the individual opinion of all Members should be taken in the matter, to see if the feeling generally is in favour of the alteration.

I would suggest that you invite the co-operation of one of your Members in every town, and where you have not a member, if there are any such, a non-Member, who would ascertain from the most respectable men in the trade what their ideas are with regard to the Society—if they have generally a wish to join us, and on what terms, &c. At the same time, the Members could be visited, and their opinion taken as to the desirability of admitting non-Members at all. If it was found that the wish of the non-Members was to join the Society, a meeting could be held of them, and a resolution drawn up and forwarded to the Society, stating upon what terms they would be willing to be admitted into the Society.

In furtherance of this object, I enclose with this (which, of course, you will consider private) particulars, as above obtained, from all the *respectable* Chemists in this town, in admitting whom, I am sure, we shall not be lowering our standard.

Respectfully yours,

South Staffordshire General Hospital,
Wolverhampton, July 12*th*, 1861.

WILLIAM HARTLEY.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

MY DEAR SIR,—At a Meeting of the local Members of the Pharmaceutical Society held here to-day, Mr. Abrahams in the chair, it was unanimously resolved—"That, in the opinion of this meeting, it is undesirable to re-open admission to the Society without examination, unless assurance be given to the Council by a large number of candidates, of equal status with present Members, of their desire to join and their willingness to pay equivalent arrears."

It was unanimously expressed that the movement in this direction is to be regretted, and that Associates and Apprentices of 1853 have no claim to admission except by examination; and it was generally considered, that the number of persons in business in Liverpool in 1853 who would be now willing to join under the proposed Bye-law would be exceedingly small, and estimated at from three to five. The meeting was adjourned for a month for further information as to the movements of the Council.

I forward the above for insertion in the Journal, and will forward a further report of what transpired for the consideration of the Council.

I am, yours faithfully,

Liverpool, July 24*th*, 1861.

J. BAKER EDWARDS,
Hon. Local Sec.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

DEAR SIR,—I think it may be assumed that the letters which appear in the *Pharmaceutical Journal* for this month, express all the objections which can be urged against the proposed alterations of the Bye-laws, and with the view of promoting an explanation of, or answer to these objections, I venture to convey to you the ideas on the subject which have occurred to me. Standing somewhat in the relation of a foster-father to the proposed new rules, I may be excused for feeling an interest in them.

It will be convenient to take the objections in the order in which they are presented. First in order, is the forcible letter of Mr. Booth. In the 3rd, 5th, and 11th paragraphs of his letter, he assumes that one of the leading objects of the Society has been, and is, compulsory legislation; whether his assumption is correct or incorrect is not now in question, but if it is correct, there cannot be a doubt that to promote compulsory legislation it is of importance to increase the number of Pharmaceutical Chemists, not only for the purpose of giving greater weight to the Society, but also of weakening as far as practicable, the opposition which is certain to arise.

I agree in the remark made in clause 5, that "whenever we apply to the Legislature for a compulsory Act, inquiry will naturally be made into our proceedings during former years," but not in the suppositions which follow, for they do not correctly portray the real proposal. The fact is, that the Pharmacy Act contemplates the admission at all times, subject to reasonable Bye-laws, of all persons who, at the date of the Act, stood in the position of the majority of the then Members of the Society. And it will be well for the Society to show that the provisions of the Act have been liberally construed for the purpose of supplying the public with the largest possible number of "Pharmaceutical Chemists," rather than by arbitrary Bye-laws cut down to the narrowest limits, whereby the intention of the Legislature has been

partially defeated. It will be a fatal objection if our opponents can urge that bad faith has been kept with the Legislature.

In clause 6, it is asserted that gentlemen have, by standing aloof, hindered the operations of the Society. I admit the proposition, but cannot admit the inference that their being now held aloof will promote these operations. I for one consider that they can well assist, and will greatly assist, the operations of the Society if admitted to it. It is not proposed to admit them upon easier terms than present Members of like qualification, and it is not fair to assume that they only desire to share the honours of the Society; the remark is illiberal, and suggests the retort that selfish motives influence excluding parties. The membership of those whom it is proposed to admit will assist the Society by their numbers, by their influence, and by their admission fees and subscriptions—their exclusion may occasion and give leaders to a formidable opposition.

The suggestion that unworthy persons will be admitted under the proposed rule, is met by the fact that in 1853 no embarrassment arose on that account, and that a Bye-law exists for the expulsion of such persons. It may also be remarked that the examination test applies to skill only.

I now proceed to the letter of Mr. Hornsby. The early part of it is directed to the question, "Are we progressing?" and its bearing upon the proposed new Bye-law. He says that we are not progressing, because more Members are desired. I would answer, that the Society is progressing, and that it is so, is evidenced by the desire of those formerly dissentient to be enrolled Members. Under the existing Bye-laws, the Society has not progressed in point of numbers, and inasmuch as that is the only point in which this Society has not progressed, it will be "short-sighted policy" not to accept the numbers who only await the opportunity.

The remaining portion of Mr. Hornsby's letter amounts to a criticism of those who would become eligible for membership under the proposed Bye-law, and of the public. As one of the uninitiated public, I must say that his criticism of us appears unfavourable. I am of course less competent to express an opinion upon his criticism of the proposed new Members, but, judging of the matter by what I daily witness of the unexamined Members of the Society, I should say, not only that the criticism is unfavourable, but that the examined portion are vastly gainers by the admixture of the unexamined in the Society, and that the gradual dying out of the unexamined portion should be compensated for by the admission of others of equal status; those who would be admitted by the new rule are the seniors in the various long-established concerns, and as a solicitor I can attest that it is more advantageous to belong to a large and powerful body composed of examined juniors and unexamined seniors, than it would be to form an item in an exclusive body composed of the examined juniors only.

One word on the reference made to certain learned bodies. It will be found that their Acts of Parliament imposed no restrictions or disabilities on their practitioners.

Mr. Groves, in his letter, suggests objections to the giving of discretionary power to the Council, and also suggests limitation to the operation of the proposed Bye-law. It is proposed to do as Mr. Groves suggests on the first point—viz. to have "a plan laid down for the exercise of the power;" the plan proposed is identical with that of 1853, which proved to work well; the limit will not admit those whose qualification dates subsequently to 1853, and it is not proposed again to close the door to that class.

With regard to limitations as to age, &c., there can be no objection to them if the necessary majority of Members desires them.

Mr. Hopwood's letter speaks contemptuously of the supposed addition of some 600 Members, and then says, "Let us have a compulsory Act ready for next session of Parliament." Let me assure him that any one charged with promoting a compulsory Act would lay great stress upon having 600 gentlemen enrolled as members of the Society instead of being marshalled against it, and let me also assure him that it will be contrary to precedent if any compulsory Act is obtained without protecting and preserving existing interests. I should also look upon 600 additional Members as so many gentlemen interested in the Society, and careful to make their successors in business "Pharmaceutical Chemists," as distinguished from Chemists and Druggists.

I think that the foregoing will be found practically to answer the letter of "An

Associate." He is in error in stating that the Council is debating the question of the admission of all regular Chemists and Druggists without examination; his proposal for future legislation corresponds in spirit with the proposed new Bye-laws.

The letter of Mr. Hornby forcibly illustrates the expediency of the proposed change. It is obvious that the object of limiting the date of admission in 1853 was only to accelerate tardy applicants. That object was, no doubt, answered, and the ranks of the Society were thus strengthened. I cannot think that the Bye-law was intended to fetter the future operations of the Society. One of the fundamental objects of the Society was "the protection of those who carry on the business of Chemists and Druggists;" surely it cannot be said that those who did not join before 1853, if then Chemists and Druggists, were not objects of the Society; the Legislature has not said that any of such objects shall be excluded, and it would appear to be now inexpedient to exclude any unnecessarily. The simple question, then, is, whether the exclusion is a present necessity? There is but one argument in favour of the exclusion, and that is the debatable one whether or not a pledge for its continuance has been given to the examined Members. I can find no trace of any such pledge (expressed or implied) having been given, but assuming (for the purpose of argument only) that such a pledge has been given, it yet remains a question, upon which a majority of the examined and unexamined Members may well bind the Minority, whether to remove the restriction will not be *beneficial* to the examined Members, and if the ayes have it, unfavourable critics can say no more than that the Society has endeavoured to meet an acknowledged change of circumstances.

I am happy to note that, with the exception of the above, no objection whatever is made to the proposed alterations in, and additions to, the Bye-laws.

You will observe that I have not advanced the general arguments in favour of the proposed new Bye-law, except to the extent necessary to meet objections.

I am, dear Sir, yours very truly,

68, *Cheapside, E.C., 27th July*, 1861. WILLIAM FLUX.*

PHARMACY IN MANCHESTER.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—Your correspondent "H. J. W." asks for an account of the present state of the Manchester Pharmaceutical Association, and in the course of his remarks says—"He can see no cause why, in our important city, &c., we should have neither a college nor the spare room of an institute to represent Pharmacy." Taking the "city" at his estimate, it ought certainly to support a Pharmaceutical Association, with a library and museum, and lectures on Chemistry and other allied subjects, for the benefit of the younger Members of the body; but, unfortunately, there are two or three "causes" why we have none of these things—causes which have already been fatal to the permanency of two attempts to establish a Pharmaceutical Association, and which I have not much hope of seeing removed.

It is not my purpose to give a history of the rise and progress, decline and fall of the last attempt to establish a Pharmaceutical Association in Manchester, but a short sketch of the proceedings during the last session of its existence, may perhaps sufficiently account for its present prostrate condition.

The Session usually commenced in October, with a course of lectures on Chemistry, followed during the summer by a course of lectures on Botany or Materia Medica. In the winter, evening meetings of the Members were held monthly, at which papers were read, and any matters of interest discussed. The Society continued in a tolerably flourishing condition until the commencement of the Session 1856-7, when unmistakable indications of decay began to appear. Many Members withdrew, and many others were with great difficulty induced to continue, whilst the lecture class, which in the previous year had exceeded thirty, dwindled down to eleven. As the winter passed on matters grew still worse; the evening meetings were so badly attended, that after the first two or three no one would take the trouble of preparing a paper to read it to the chairs and tables, whilst the attendance of students at the lectures rarely exceeded

* Messrs. Flux and Argles, Solicitors to the Society.

seven or eight. Besides all this, there was a considerable excess of expenditure over income. Under these circumstances, the committee, finding their efforts fruitless, with no probability of increased support to enable them to carry on another Session with any prospect of success, did not feel inclined to become responsible for any further expenses; and since then (except that in 1858 the President and Secretary waited on the Professor of Chemistry at Owen's College, with a view of making arrangements for a course of Lectures on Chemistry, which no one, as far as I remember, ever offered to attend) no further attempt has been made to carry on the Society. I am, Sir, your obedient servant,

Cheetham Hill, Manchester, July 18th, 1861. W. WILKINSON.

PRESCRIBING BY DRUGGISTS.

Huggins v. *Jonas.*

(Exeter District County Court, J. TYRRELL, Esq., Judge.)

THE plaintiff, a chemist and druggist of this city, claimed of defendant, a pawnbroker, £2 8*s.* 9*d.* for medicine. Mr. Willesford appeared for defendant's wife, the defendant being now an inmate of an asylum.

Mr. Huggins stated that he had supplied, from time to time, the defendant with pills, draughts, &c.; and it was elicited, in cross-examination, that the plaintiff had on one occasion remonstrated with Mrs. Jonas for allowing her husband to take four times as much medicine as he ought to have taken in one day. When Mr. Jonas came to his shop he complained of certain pains, asked for a remedy, and medicine was accordingly supplied by plaintiff.

Mr. Willesford said that the defendant was insane at the time these medicines were prescribed, having been, by the kindness of his friends, allowed to be at large too long. The defendant's wife complained that medicines had been supplied to her husband, whilst in that state, in undue quantities, and that was her reason for resisting the claim.

His Honour (to plaintiff).—You have no right to prescribe without a certificate.

Plaintiff.—I think we have, your Honour; but we have no right to visit patients.

His Honour.—Will you show me the right? I do not know how you can recover for anything prescribed by yourself.

Plaintiff.—I have never seen anything to the contrary. Of course I give up to your Honour's judgment, but I know of no law to prevent my prescribing.

His Honour.—The first thing I ask, when an apothecary comes with his bill, is for his certificate as belonging to the Company, and I require this before I allow him anything.

Plaintiff.—It would be very awkward, when persons come to our shops very ill indeed, and ask us for some medicine, if we could not prescribe for them.

Mr. Daw.—Such persons should send for a medical man.

His Honour.—The doctrine laid down by the plaintiff is new to me. Have you any doubt as to my ruling, Mr. Daw?

Mr. Daw.—None whatever, your Honour. Indeed, I go further, and say that he is liable to prosecution. If I go to a druggist's shop, and say I am ill, and want a box of Cockle's pills, or any other medicine, the druggist may supply it; but if I say, "I am ill, what had I better take?" and the druggist prescribes for me, then he is acting contrary to law.

His Honour.—Just so. In the present case, I am not sorry you have got a pound (the amount agreed to be paid), but I think you are lucky to get it. His Honour then repeated, in substance, the law as expounded by Mr. Daw, and said it was very important in a city like this that it should be well understood.—*Western Times.*

SALE OF DRUGS BY GROCERS.

AT the Nottinghamshire Assizes, before Chief Baron Pollock, John Moore, twenty-six, grocer, bailed on committal, was charged with the manslaughter of Mary Jane Froggatt, at the borough of Newark, on the 8th of May, 1861. The prisoner pleaded not guilty. Mr. Stephens appeared for the prosecution, and Mr. O'Brien for the defendant. Mr. Stephens, in opening the case, stated that the prosecutor went to prisoner's shop at Newark to purchase of him a mixture of syrup of violets and

oil of almonds. The prisoner had, however, given, as he should prove, essential oil of almonds, and when it was administered to the child, it caused its death.

Dinah Kemp said she was sister to Mrs. Froggatt. In May last was sent by her sister to prisoner's shop to buy one pennyworth of essence of violets and one pennyworth of essence of aniseed. Mr. Moore gave her violets and essence of almonds, and the child died soon after taking it.

Mary Froggatt.—I am the wife of William Froggatt, and the mother of Mary Jane Froggatt. On the 8th of June I sent my sister for a pennyworth of oil of almonds, and she brought a pennyworth of aniseed. In consequence of the mistake, I went to my husband for a written order. I gave the order to the prisoner, and I said, "What did you give my sister?" He said, "Oil of aniseed." I said, "I want oil of almonds." He took the order in his hand and read it. I asked him to change it, and he said he would. I told him my husband had been advised to give the child a teaspoonful of essence of violets, and two drops of oil of almonds. He said to me, "There's prussic acid in it." I said, "Will it hurt my baby?" He said, "Oh, no, it is not rank poison." Mrs. North, to whom I gave the bottles, gave my baby about three parts of a spoonful of the violets, and two drops of oil of almonds. When the child had taken it, it stretched itself out and seemed to get stiff. I then went to the dispensary, and saw Dr. Irving. The child was fourteen weeks old. I put the bottles into Mr. Irving's hands.

By Mr. O'Brien.—I had never bought oil of almonds at Mr. Moore's shop before. I saw no one there when I bought the oil of almonds. I told him I wanted oil of almonds—he told me there was prussic acid in it, but it was not rank poison. I had no idea prussic acid was rank poison.

William Froggatt, tailor, examined: I am the father of the deceased child. I wrote an order to Mr. Moore for my wife.

Jane North said: Mrs. Froggatt brought her baby to me on the 8th of May. I gave her about a third of a table-spoonful of violets and two drops of oil of almonds. When the child had taken it it became stiff, and the mother went to look for a doctor.

James Irving.—I am a doctor of medicine. In May last I was surgeon to the Newark Dispensary; I had been so two years and four months. On the 8th of May Mrs. Froggatt brought me her child; it was dead. She brought two bottles. I found one of the bottles had contained essential oil of almonds. Oil of almonds is used in medicine, but not essential oil of almonds; three drops would destroy the life of a child. I made a *post-mortem* examination, and I consider the child died from the administration of essential oil of almonds.

By Mr. O'Brien.—Essential oil of almonds is very seldom administered.

This was the case for the prosecution.

Dr. Irving recalled.

Chief Baron Pollock.—Is there any difference between sal volatile and the spirit of sal volatile?

Dr. Irving.—Spirits of sal volatile and sal volatile are the same. The essential oil of almonds is made from bitter almonds, and is made by a different mode. The common oil of almonds is made from sweet almonds principally.

For the defendant, Mr. O'Brien contended that it could not be said that he was answerable in the same degree as if he had been an educated chemist; that he could not be held responsible for not knowing the difference between the oil of sweet almonds and the essential oil of almonds. The defendant was a young man just entering business, and since the melancholy occurrence he had got rid of all drugs out of his shop, and would confine himself for the future to his legitimate grocer's business.

His Lordship addressed the Jury, and said—The prisoner stands in a better position from his having warned Mrs. Froggatt that it contained prussic acid, because I should have thought that every person capable of reading and writing at all would have known the fatal character of prussic acid. I think I ought to call your attention to the fact that the defendant, in one sense, knew that he was selling essential oil of almonds, and he warned Mrs. Froggatt of the presence of prussic acid in it; in substance saying, "What I am giving you is a kind of oil of almonds, but it is an essential oil of almonds." I believe the bottle in which this essential oil of almonds was put contained spirit of sal volatile, and I questioned Dr. Irving upon the subject. It is to be regretted that sal volatile and spirit of sal volatile should be the

same thing, and yet that oil of almonds and essential oil of almonds should be so different. Dr. Irving gives it as his opinion that the child died from taking essential oil of almonds. The defendant did not administer the essential oil of almonds; he gave it to Mrs. Froggatt, and he said, "Beware!" He made no mistake, except that oil of almonds did not mean essential oil of almonds. He is not a chemist, and, therefore, he can hardly be held as responsible as a person professing to mix and make up prescriptions.

The Jury returned a verdict of *Not Guilty.*

CHARGE OF MANSLAUGHTER AGAINST A "MEDICAL BOTANIST."

Crown Court, Bedford.

(Before Mr. Justice Whitman.)

William Francis Crick, described as a "medical botanist," aged forty-one, was tried on the above charge, at Bedford, July 17. It appeared that the mother of the deceased (a child of eight years of age) had applied to the prisoner on December 25, for some medicine for her daughter, who was suffering from an intermittent sickness. The prisoner gave her a powder and three pills which were taken by the deceased, who died on the 27th of December. The medical evidence advanced by the prosecution was, that the child died of peritonitis, and that the death might have been hastened by the mixture of lobelia, cloves, and capsicum, administered by direction of the prisoner, but the medical witnesses would not say that death was caused by the medicine.

Mr. Justice Whitman directed the jury, in the words of Lord Lyndhurst, C.B., in Webb's case, (1 Moody and Robinson, p. 405, Roscoe, p. 706), "that in the case of a licensed physician or surgeon, and in that of a person acting as physician or surgeon without a licence, there was no difference. In either case, if a party having a competent degree of skill and knowledge makes an accidental mistake in his treatment of a patient, through which death ensues, he is not thereby guilty of manslaughter; but if where proper medical assistance can be had, a person totally ignorant of the science of medicine takes upon himself to administer a violent and dangerous remedy to one labouring under disease, and death ensues in consequence of this dangerous remedy having been so administered, then he is guilty of manslaughter." The medicine administered in this case might have been highly improper, but no one of the witnesses having stated that it was the cause of death, or that the deceased would not have died had it not been given, it would not be safe to convict the prisoner of manslaughter.

The jury at once returned a verdict of *Not Guilty.*

The prisoner had been tried and acquitted at Bedford, in 1859, before Chief Baron Pollock, on a similar charge.

MISCELLANEA.

Internal Administration of Chloroform.—It has been stated by M. Bonnet, pharmacien to one of the Paris hospitals, in a paper published in the *Journal de Pharmacie*, that if equal parts of chloroform and the finest glycerine are mixed in a mortar until the droplets of chloroform cease to be visible, the resulting compound is miscible with water or other adjuvant without any separation of the chloroform taking place, "even when more than 100 parts of chloroform are added to distilled water."

The fallacy of the above statement has been pointed out by Mr. Squire in a communication to the *Medical Times and Gazette*, in which periodical an abstract of M. Bonnet's paper had appeared. Mr. Squire observes:—

"Half a fluid ounce of Duncan's chloroform, sp. gr. 1.497, was triturated in a mortar with an equal quantity of Smith's pure anhydrous glycerine, and it was not until the rubbing had been dexterously continued for ten minutes that the droplets of chloroform disappeared. The resulting product measured scarcely five drachms, so that at least 75 per cent. of the chloroform had been lost in the process. When this mixture of glycerine and chloroform was mixed with water, the chloroform quickly separated and fell to the bottom.

"It would seem from this, that the disappearance of the droplets is chiefly due to the evaporation of the chloroform, and, if the rubbing be carelessly performed, or

the time much protracted, the glycerine would, at the end of the rubbing, be sufficiently pure for a second experiment, and, as such, miscible with water, and harmless as an external application."

Ferri Carbonas Effervescens: a New Form of Chalybeate.—Dr. T. Skinner, in a communication to the *Dublin Medical Press*, recommends the following formula for preparing effervescing carbonate of iron:—

℞ Acidi Tart., ℥iij.
Sodæ Bicarbonatis, ℥v.
Ferri Sulph., ℥x.
Pulv. Sacchari, ℥j. ℥vj.
Acidi Citrici, ℥ij.

1. Mix the sulphate of iron with the sugar and part of the tartaric acid. 2. Mix the citric acid with the remainder of the tartaric acid and the bicarbonate of soda. 3. Add the mixtures, and thoroughly incorporate them by sifting. 4. The whole is now to be thrown into a metallic pan set in a water-bath; in a few minutes it will separate, when it should be rapidly stirred until granules are formed. If preferred, it may then be flavoured with oil of lemon; hitherto, however, the preparation has been without it.

When the above is carefully prepared, it has all the appearance of the popular and well known granular effervescent citrate of magnesia, with the addition of a slight yellowish green tint. Every drachm and a half contains ten grains of sulphate of iron, which, with a complement of bicarbonate of soda, is certain to produce, in a state of solution, four grains of nascent protocarbonate of iron.

New Test for Diabetes.—This test consists in the conversion of the saccharine element of diabetic urine into caramel by heat.

The following is the mode of applying it:—

"Upon a clean slip of tinned iron place one or two drops of the suspected material, and hold it over a spirit lamp; the fluid will speedily evaporate, leaving, if the process be arrested at that point, scarcely a trace upon the metallic surface. Continue the application of heat; in a few moments after the desiccation is complete, a spot of an inch or so in diameter, over which the drop spread with the first ebullition, will gradually assume a rich reddish-brown colour, with a brilliant lustre, as if coated with a film of Japan lacquer. A solution of sugar, not diabetic, exhibits almost exactly the same reaction."

Saccharate of Colchicum.—Dr. Joyeux (*Southern Medical and Surgical Journal*) recommends this preparation in the treatment of gout and articular rheumatism. It is prepared with one hundred grammes of fresh juice and five hundred grammes of sugar, and evaporated to dryness *in vacuo*. He also directs an extract of the juice of colchicum, evaporated *in vacuo*, to be rubbed on the painful parts. The saccharate is given in the average dose of four grammes per diem, divided into ten parts, one of which is taken every hour.

"Axtramankaz."—In the course of a trial on a will case, in the Court of Probate and Divorce, before Sir C. Cresswell, "Jones *versus* Her Majesty's Proctor," the following curious evidence was elicited:—

The plaintiff, Dr. David Griffiths Jones, when cross-examined by the Queen's Advocate, said—"I have practised homœopathy and also hydropathy for nine or ten years. I combine the two systems. By hydropathy I mean hot and cold water treatment, diet, and exercise. I was originally bred an allopathist. I know a medicine called, not the 'astramancax,' but the 'axtramankaz.' (Laughter.) I don't know at all what the word means. I bought the receipt from which I make the axtramankaz from an old Dutchman in London, whose name I forget. It is a farinaceous substance, a substitute for cod-liver oil. It may be made of cereals, rice, and other compounds. There is a common vegetable produce in it. What it is is my secret. I had an establishment for its sale at 449, New Oxford Street. I had an assistant there, Mr. George, who brought an action against me. The sale went on in New Oxford Street until 1857, when the establishment closed. The commodity is still sold at any wholesale chemists. I took out a patent for it, but I forget when. I took my degree at Aberdeen in April, 1853. The Dutchman's receipt was not written in Latin or in Dutch but English. I have lectured on hydropathy and homœopathy at various halls in London and in the country."

It was proved that the plaintiff had never been to Aberdeen, but there had been an understanding between him and a man named Reeves, who had represented Jones at the examination, and had obtained a degree of M.D. of Marischal College, Aberdeen, by passing the examination, and signing the paper "D. G. Jones."

Poisoning by Laudanum.—On Thursday, June 27, Jane Palethorpe, about forty years of age, residing at 15, Northampton Street, King's Cross, was brought up at the Clerkenwell Police Court, charged with the wilful murder of Thomas Palethorpe, aged four years, by administering to him a quantity of laudanum; further, with administering laudanum to John Richard Palethorpe, aged eight, and Harriet Palethorpe, aged two, with intent to kill; and further, with attempting to commit suicide by taking poison.

Evidence was given by Elizabeth Falkner, residing in the same house, to the effect that the room of the prisoner being unusually quiet, she knocked at the door several times without getting any answer; at length the eldest boy answered in a faint voice that his mother was ill. Witness requested him to open the door, when she found the mother and children looking very ill, the former unable to speak. Mr. Henry Sutherin, surgeon, of St. Pancras Road, was sent for, who deposed that he found the prisoner lying on the bed insensible, a child almost lifeless, and two other children in a very drowsy state. There was a bottle on the mantelpiece labelled "Poison," and in another part of the room another bottle was found with the label scratched off, containing a few drops of laudanum. Witness attempted to restore animation, and managed to rouse the prisoner, who, in reply to his question as to what she had taken, and what she had given to the children, said, "Laudanum." The eldest and the youngest children were restored, but the second child died in about twenty minutes.

Exception was taken to the fact that the prisoner had not been cautioned previous to her statement about the laudanum, but the magistrate decided that what had been said was fair evidence.

It was stated that the prisoner lived very unhappily, and had more than once threatened to take the life of herself and of her children.

The inquiry was adjourned to Thursday, July 4, for the purpose of receiving Dr. Letheby's report, who had made an examination of a portion of the child's stomach. Dr. Letheby stated that he found it free from disease, and that it contained about two ounces of a thick fluid, which, on being subjected to chemical analysis, gave traces of morphia and meconic acid. He did not find any other poison. Traces of morphia and meconic acid were also found in the contents of the intestines. He concluded from what he had observed, that opium had been administered, and attributed death to that cause. The prisoner was committed for trial on the charge of wilful murder of her child.

At the trial the jury returned a verdict of *Not Guilty*.

Attempted Suicides by Laudanum.—At the Lambeth Police Court, on Saturday, July 13th, Mrs. Susan Broughton, aged 19, was charged with attempting to commit suicide by swallowing twopennyworth of laudanum. It was stated that the laudanum was supplied by Mr. Desny, a chemist in the neighbourhood, to a little girl only eight years of age. This circumstance was referred to by the magistrate, who said that while the Legislature had enacted stringent laws against the sale of arsenic, laudanum was comparatively overlooked, but he hoped Mr. Desny would be more careful for the future.

At Greenwich, on Monday, July 15th, Eliza Osborne, a middle-aged woman, was also charged with attempting to commit suicide by swallowing sixpennyworth of laudanum. The police-constable stated that a medical man was sent for, who administered an emetic, and the prisoner was, with much difficulty, restored to consciousness.

Death From Opium.—An inquest has been held by Mr. Serjeant Payne at the Red Lion, Shoe Lane, on Ann Cole, aged nineteen, lately dwelling with her mother in Elm-Tree Court, Fetter Lane. A *post-mortem* examination had been made of the body, and opium was found in the kidneys. The deceased's mother and other witnesses said they had never heard her express any intention to destroy herself, and there was no evidence whatever to fix suspicion on another as having done so. The jury returned a verdict that "The deceased came to her death from the effects of opium, but how she came possessed of it there was no evidence to prove."

BOOKS RECEIVED.

THE TECHNOLOGIST: *A Monthly Record of Science applied to Art and Manufacture.* Vol. I. Edited by PETER LUND SIMMONDS, F.S.S., &c.

The first volume of this monthly periodical is now completed, and reflects great credit upon the editor for the able manner in which he has performed his duties. It ought to be in the hands of all those who take an interest in the commercial prosperity of this country.

THE HALF-YEARLY ABSTRACT OF THE MEDICAL SCIENCES, January—June, 1861. London: John Churchill. Edinburgh: Maclachlan & Co. Dublin: Fannin & Co.

THE DRUGGIST'S GENERAL RECEIPT BOOK: *comprising a copious Veterinary Formulary, numerous Recipes in Patent and Proprietary Medicines, Druggists' Nostrums, Perfumery, and Cosmetics; Beverages, Dietetic Articles, and Condiments; Trade Chemicals, Scientific Processes, and an Appendix of useful Tables.* By HENRY BEASLEY. Fifth Edition. London: John Churchill, New Burlington Street. 8vo, pp. 494. 1861.

TO CORRESPONDENTS.

Coal-Tar Emulsion.—In reply to inquiries respecting this preparation, we give the following formula, as published in *Bull. de Thérap.*, vol. ix., p. 130, and recommended by M. Demeaux:—

"Of coal-tar, soap, and alcohol, equal parts are to be heated in a bath until complete solution is effected, and, on cooling, a very soluble soap is produced, which, with water, makes a stable emulsion. Three kilogrammes will emulsify 100 litres of water, each litre containing 10 grammes of coal-tar.

The coal-tar soap thus combined is very manageable, and may be used in any degree of concentration, its great solubility in cold or warm water preventing its soiling any substance it comes in contact with."

W. H. B. (Leicester).—*Tincture of Sumbul:*—

Rad. Sumbuli, ℥ij.
Spirit. Tenuioris, ℥xvj.

Macerate seven days, and strain. Dose, from 20 to 30 minims.

Q. (Leeds).—There is no ready means of ascertaining the presence of methylated spirit in sweet spirit of nitre, excepting by the smell and taste.

X. Y. Z. (Halifax) wishes for a formula for a liquid green colour which may be safely used in confectionary.

G. C. (Maldon).—The label in question would render the article liable to the medicine stamp duty.

C. F. B. (Harwich).—*Trifolium in Fœno.* Common clover hay is intended.

K. K.—We know of no published formula. A description of Indian Bael and its properties will be found in vol. x., page 165.

A Junior (Rugby).—Apply by letter, giving name and address, to the Secretary, 17, Bloomsbury Square.

A Registered Apprentice (Sheffield).—The full particulars may be obtained on application by letter to Mr. John Mackay, 121, George Street, Edinburgh.

Mr. S. Thornton is thanked for his enclosure.

J. W. E. and *W. C.*—The case alluded to has been arranged by payment of arrears.

The communications of *C. S.*, *J. S. S.*, and a *Chemist's Assistant* are received, but are not considered suitable for publication.

OMITTED LAST MONTH FROM THE LIST OF ASSOCIATES.

Page 88.....	1841		Hindsley, Henry.....London.
" 90.....	1853	578	Jones, Charles William.....Carmarthen.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, ELIAS BREMRIDGE, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. CHURCHILL, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. III.—No. III.—SEPTEMBER 2nd, 1861.

THE QUESTION OF THE BYE-LAWS.

The proposition which has been made for altering the Bye-laws has led to a discussion and inquiry, which we hope will prove beneficial to the Society. In the discussion several erroneous opinions have been corrected, and from the letters received and the inquiry which has been instituted by the Local Secretaries throughout the country, the opinions of the Members of the Society have been elicited upon an important question, and much valuable statistical information obtained. In the first instance, some Members appeared to be under the impression that it was proposed to lower the standard of qualification for membership, and to relax the fundamental principle of the Society and of the Pharmacy Act, in accordance with which, examination in the science and practice of Pharmacy is made the means of stimulating students to the acquirement of increased information, and a test of qualification in those who are to assume the title of Pharmaceutical Chemist. No proposition has been entertained, that we are aware of, to depart from this principle with reference to those who are entering, or have recently entered, the profession, and all that the Society has done from its commencement up to the present time has indicated a fixed determination to carry out to the fullest extent practicable the system of improved education and of examination, for which provisions have been most liberally and disinterestedly made by the Members of the Society. The Council certainly have entertained a proposition, which was urged upon them from several quarters, to re-open the means of admission by certificate to those who were established in business before the passing of the Pharmacy Act, but they showed no disposition to act precipitately, or to form a hasty opinion on this subject. It was considered to be one deserving deliberate consideration and a careful inquiry, with reference to the probable influence upon the Society of the proposed concession. Expression of opinion was invited from Members in different parts of the country, and this invitation has been freely and ably responded to. At the same time the Local Secretaries have been requested to obtain and supply, for the use of the Council, statistical information as to the number of Chemists in their several districts who, having been in business prior to the passing of the Pharmacy Act, do not now belong to the Society, but may be considered eligible for election, and the number of such who would be disposed to join the Society upon the terms stated. Returns have been thus obtained from upwards of a hundred and fifty of the principal towns, and so valuable is the information these papers convey, that we strongly urge upon those who have not yet made the return, to do so with as little delay as possible. The Members who kindly undertake this duty are conferring an important benefit upon the Society, by affording to the Council a knowledge of facts not otherwise to be obtained, and which will greatly assist them in the settlement of this and other questions which may arise affecting the welfare of the Society.

The returns being still incomplete, no further steps have been taken or opinion given by the Council, but, as stated in our last number, we think it very unlikely that they will feel justified in proceeding further with the matter while so many influential Members of the Society entertain, and publicly express, unqualified objection to the proposed measure. The published letters represent but a small proportion of those who have made known their sentiments. Of the communications received, amounting to about two hundred, nearly one-half are opposed to the measure, and the returns hitherto obtained clearly indicate that

the addition to the Society which it would probably effect has been greatly over-estimated by those who have most warmly advocated the change.

The result of the inquiry is, in one respect, very satisfactory. It shows that the Pharmaceutical Society fairly represents the most respectable part of the Pharmaceutical body throughout the country, and that it is only by pursuing the course hitherto adopted by this Society, of training up a class of educated and qualified men, who shall be prepared to take their legitimate positions as Pharmaceutical Chemists, that the limits of the Society can, to any extent, be enlarged.

THE REPRESENTATION OF PHARMACY AT THE INTERNATIONAL EXHIBITION OF 1862.

In the number of this Journal for April last, we directed the attention of our readers to the importance of securing a proper representation of pharmaceutical products and processes at the Great Exhibition of 1862. We now recur to the subject, with the hope of getting the active co-operation of Members of our Society and others to provide such an exhibition of substances used in medicine in this country as shall fairly represent the existing state of Pharmacy amongst us. Rapid progress is being made with the Exhibition building in course of erection at South Kensington; exhibitors have been invited to make their applications for space, and notice has been given that no further applications can be entertained after the 30th September (this month).

At the Exhibition of 1851, Pharmacy was but imperfectly represented, and would have been so to a far greater extent if Mr. Bell had not exerted himself, when but little time was left for the purpose, to get together a collection of drugs not otherwise supplied, which he exhibited as joint contributions of the London Druggists. At the forthcoming Exhibition it is proposed to accomplish what in 1851 was effected by Mr. Bell, by means of a Committee, which has already been appointed by the Council of the Pharmaceutical Society. The Committee consists of the whole of the Council, together with the Professors, and Messrs. Allchin, Barnes, Bastick, Brewer, Cracknell, Darby, Daniel Hanbury, Horner, Robert Howard, Morson, jun., Warington, and Williams, with power to add to their number. The object is to make such arrangements as may be necessary to ensure a creditable exhibition of drugs and pharmaceutical preparations, by supplying the deficiencies left by individual exhibitors. Such deficiencies will inevitably occur, and it has been suggested that, in addition to the usual isolated contributions of individuals, in which there will necessarily be many repetitions and likewise many omissions, there should also be a complete and united collection, to be got together and arranged by the Committee. This united collection will be made as complete as possible, and will comprise all the drugs and preparations used in medicine in this country. The specimens will be obtained from different contributors, whose names they will bear, but they will be arranged systematically in one large group. In many instances there may be several specimens representing the same article, but contributed by different exhibitors. Where different processes are adopted for nominally the same preparation, the products will be brought into comparison and competition. There will thus be different varieties of *Liquor Taraxaci* and other preparations, which often differ widely according to the process adopted in making them. Many articles present few or no points of interest, and these will occupy a subordinate position in the collection; nevertheless, they will be put in to complete the collection, while in other instances there may be many competitive specimens. If this plan be efficiently carried out, and the specimens well arranged and labelled, the collection will, we believe, be a very interesting one. All the preparations of every sort used in medicine, will be here brought together, and we believe no such collection has ever yet been publicly exhibited. It will be a Druggist's shop on a very comprehensive scale, arranged for exhibition and not for use. The specimens

need not be large, but they should be so exhibited as to admit of their being examined under the supervision of an attendant.

It has been suggested, also, that there should be another collection distinct from the foregoing, and representing all the articles described in the forthcoming British Pharmacopœia. This of course assumes that that work will be published in time to admit of such a collection being made.

The different means which are or may be adopted for the preservation of those medicines which are liable to change from the action of air or light, and arrangements for the prevention of accidental poisoning, would be suitably exhibited in connexion with the foregoing.

At a Meeting of the Committee held at 17, Bloomsbury Square, on the 23rd of August, Mr. Squire in the chair, the following resolutions were passed :—

"1. That it is desirable to ensure, as far as possible, at the International Exhibition of 1862, such an exhibition of substances used in medicine as shall fairly represent the existing state of Pharmacy in this country.

"2. That the formation of a collection of drugs and pharmaceutical preparations, contributed by different exhibitors, but arranged systematically in one large group, comprising, if possible, all the substances used in medicine in this country, would tend to fulfil the object contemplated in the foregoing resolution.

"3. That it is desirable to have a separate collection comprising all the articles described in the forthcoming British Pharmacopœia, forming a distinct group, and that there be only one specimen of each article in this group, such specimens to be approved by this Committee.

"4. That, with the view of carrying out the foregoing resolutions, a Sub-Committee be appointed, consisting of—

The President,
The Vice-President,
The Treasurer,
The Professors,
} of the Pharmaceutical Society;

Messrs. Allchin, Barnes, Bastick, Brewer, Cracknell, Darby, Deane, Daniel Hanbury, Hills, Horner, Robert Howard, Morson, jun., Warington, and Williams, with power to add to their number, and to subdivide themselves into smaller working committees."

THE JACOB BELL MEMORIAL SCHOLARSHIPS.

Since the publication of the notice which appeared last month relating to these Scholarships, an important alteration has been made in the terms on which they will be held. It is now arranged that the Bell Scholars shall receive the usual laboratory instruction free of charge, in addition to the payment of thirty pounds to each. The value of the Scholarships is thus increased to nearly double, as the only payments to be made in the laboratory will be for apparatus and materials consumed in working. The holders of the Scholarships will be enabled to pursue their studies at little or no expense, and no doubt there will be many competitors for such valuable appointments. The election will take place at the Council meeting on the 2nd of October, but candidates must give notice to the Secretary before the 15th of this month, September, of their intention to compete, and they will afterwards have to appear before the Board of Examiners.

The Board have adopted the following provisional arrangements for the examination of candidates :—

1. That talent shall be the criterion of merit in the candidates.

2. Candidates for the Junior Scholarship will be examined in the Latin Grammar, Cæsar (*de Bello Gallico*), the simple rules of Arithmetic, Fractions and Decimals, English Composition on a subject either pertaining to English History, Geography, or the advantages of the several sciences; also in Chemistry, Botany, and Materia Medica.

3. Candidates for the Senior Scholarship will be examined on the same subjects, with the addition of Celsus, but the examination will be more stringent.

It must not be supposed that candidates for the Junior Scholarship will be expected to pass such an examination as would entitle a student to an Associate's certificate, although the subjects of examination are nearly the same. A junior scholar is supposed to be commencing his studies, or at least to have made only that progress that might be reasonably looked for during an apprenticeship. The object of the examination is to ascertain that the candidate has such an amount of ability, and affords evidence of having made such use of it in the acquirement of elementary knowledge, as will justify the expectation of his proving a successful student, who shall do credit to the appointment, and become a useful and accomplished member of the pharmaceutical body.

Candidates for the Senior Scholarship, on the other hand, will be subjected to a stringent examination. They must have passed the Major Examination of the Society, and are supposed to be desirous of prosecuting their scientific studies beyond the point required merely for admission as Pharmaceutical Chemists.

Places are set apart for the holders of these Scholarships in the Laboratory, where they will receive free instruction, with all the advantages attending the Laboratory course as now conducted.

THE PEREIRA MEMORIAL FUND.

Shortly after the death of Dr. Pereira in 1853, a Committee was appointed for the purpose of establishing some suitable memorial of the deceased Professor in connexion with the Pharmaceutical Society. It was determined—

"That a subscription be commenced, for the purpose of obtaining the die of a medal, to be awarded as a prize for researches or proficiency in Materia Medica, under such regulations as the Council of the Pharmaceutical Society may deem expedient; and that it is desirable to raise a sufficient sum to endow the medal."

The sum of £141 18*s.* 6*d.* was collected in subscriptions, and after defraying the expenses of the die of a medal, which was deposited with the Council of the Pharmaceutical Society, a small balance was left, of which no application was made at that time, and both the die and the balance remained unused.

On the 31st of last July, a meeting of the Committee was held to consider what should be done with this balance, when the following resolution was passed:—

"The Treasurers having reported that the sum of £141 18*s.* 6*d.* was received in subscriptions in 1853-54, on account of the fund for establishing a memorial of Dr. Pereira, in connexion with the Pharmaceutical Society, which sum was put into the Union Bank of London, to meet the expenses of obtaining the die of a medal, to be awarded as a prize for researches or proficiency in Materia Medica; that £86 6*s.* was paid out of the fund for such die, and for expenses of printing, &c.; and that a balance of £55 12*s.* 6*d.* still remained at the bank;

"It is resolved,—

"That in the opinion of this Committee, the said balance should be applied in the endowment of a Pereira Medal, as indicated in a resolution passed at a meeting of the promoters of the fund, held on the 21st of March, 1853, confirmed at a subsequent meeting on the 14th of April, 1853, and reported in the *Pharmaceutical Journal;* and, with the view of accomplishing this object, that the balance (£55 12*s.* 6*d.*) be handed to the Council of the Pharmaceutical Society, with whom the die of the medal has already been deposited, and that they be requested to invest this sum as a fund or part of a fund, the interest of which shall be applied as indicated in the resolution above referred to. "T. H. Tustin, *Chairman.*"

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *7th August*, 1861,

Present—Messrs. Bird, Bucklee, Davenport, Deane, Edwards, Evans, Hanbury, Hills, Lescher, Mackay, Meggeson, Morson, Squire, and Waugh, the following were elected

MEMBERS.

LEICESTER.....Thomas Hardy Buzzard
TREDEGAR.....Benjamin Griffiths
MAURITIUS.....Volcy Berger

MAJOR EXAMINATION, *20th August*, 1861.

Duffin, Thomas .....Wakefield
Frost, George .....Derby
Poll, William Sheppard.....Bungay
Young, William .....Banbury

MINOR EXAMINATION.

Curtis, William .....Bradford-on-Avon
Fisher, Francis Dixon.....Grantham

REGISTERED APPRENTICE.

NAME.	RESIDING WITH.	ADDRESS.
Harrison, George	Mr. Harrison	Sheffield

THE JACOB BELL MEMORIAL FUND.

SUBSCRIPTIONS RECEIVED SINCE THE LAST ANNOUNCEMENT.

	£	s.	d.
Brayshay, William B., Stockton	1	1	0
Dresser, Richard, York	1	1	0
Elliott, Robert, Newcastle	0	5	0
Fisher, Francis D., Grantham	0	2	6
Goodger, David, 31, Regent Street	1	1	0
Ham, John, Nether Stowey	1	1	0
Handsley, Taylor, Louth	0	10	0
Ker, William, Rochdale	0	2	6
Laurens, F. L., Jersey	0	10	0
Long, William E., Chichester	0	10	6
Martin, James, Southampton	0	10	6
Maw and Son, 11, Aldersgate Street	25	0	0
Mercer, T. W., Rochdale	0	2	6
Plummer, George, Peckham	1	1	0
Preston and Sons, 94, Smithfield Bars	5	5	0
Pythian, Mrs., Manchester	0	10	6
Ransom, William, Hitchin	5	0	0
Swire, Roger, 14, Edgware Road	1	1	0
Sylvester, Paul, Birmingham	0	10	6
Taylor, Edward, Rochdale	0	2	6
Thomas, John, Cowbridge	0	10	6
Towers, Robert, Ulverston	0	5	0
Turner, Charles E., 63, Great Russell Street	1	1	0

	£	s.	d.
Twinberrow, William, 2, Edward Street, Portman Square	5	0	0
Umney, Charles, Bedford	0	10	6
Young, William, Banbury	0	5	0
Youngman, Robert, Cambridge	0	1	8

ORIGINAL AND EXTRACTED ARTICLES.

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On the Detection of Phosphorus in Cases of Poisoning.—A great many cases of death through poisoning by phosphorus have been recorded within the last few years. In France this has been especially the case, and phosphorus has become in that country a well-known poisoning agent; so much so, that it has been proposed to suppress altogether the employment of phosphorus in the manufacture of lucifer matches on that account. It behoves the chemist, therefore, to direct his attention more carefully to the means of detecting this substance in the body after death. The odour, and the solvent action of bisulphide of carbon, have been indicated for this purpose. M. Mitscherlich also published, some time back, a process for the detection of phosphorus in the stomach, which is remarkable for its delicacy, accuracy, and facility of application. This process, it will be recollected, consists in mixing the contents of the stomach with water acidulated with sulphuric acid, and then distilling the mixture in the dark, passing the vapour through a vertical condenser, made entirely of glass. When phosphorus is present a steady phosphorescent light is observed in the tube of the condenser.

Phosphorus, however, differs from other inorganic poisons, inasmuch as it undergoes spontaneous oxidation, the ultimate result of which is a compound normally present in the animal body. In cases of poisoning, therefore, by phosphorus, its presence must be detected before it has become converted into phosphoric acid. During the oxidation of phosphorus in the stomach, however, the product first formed would be principally phosphorous acid, a body which is not present in the animal economy.

M. Dussard proposed, some years ago, to detect phosphorus or phosphorous acid by the coloration imparted to the hydrogen flame. Whenever phosphorus, or any of its oxygen compounds, *except phosphoric acid*, are introduced into a Marsh's hydrogen apparatus, phosphuretted hydrogen is disengaged, and causes the flame to reflect an emerald green colour on introducing the plate of porcelain. This test is extremely sensitive, the end of a lucifer yielding the coloured flame continuously for upwards of an hour.

M. Blondlot has been engaged in some experiments on this reaction, with the view of ascertaining how far it can be applied to toxicological investigations. As the result of his examination of the question, he indicates that a number of minute precautions must be taken before a safe or correct result can be obtained, but that with due care the process may in certain cases prove useful.

In the first place, he finds that when the hydrogen is burnt from a glass jet the flame is generally slightly coloured. He proposes to avoid this inconvenience by terminating the tube with the platinum jet of an ordinary mouth blowpipe. This arrangement also affords the means of easily producing another characteristic phenomenon of the presence of phosphorus—namely, a small green cone, which is manifested in the interior of the flame when the extremity of the tube is sufficiently cooled. This is readily done by wrapping round the jet a piece of wet cotton.

It is also important to operate in darkness, or with a very subdued light. A flame which, under such circumstances, manifests a distinct green colour, shows nothing in direct sunlight.

M. Blondlot finds that all the zinc of commerce contains traces of phosphorus sufficient to communicate a green tint to the flame in a dark room. This impurity he attributes to the iron present in the zinc. The metal may be rendered perfectly pure by redistillation. The action of dilute acids upon this pure zinc, however, is so slow, that the hydrogen is not generated at a rate sufficiently rapid to maintain the combustion. M. Blondlot, therefore, employs an apparatus for the generation of the gas somewhat resembling Dobereiner's lamp, in which the gas first collects under pressure, and is then burnt. A U-tube intervenes between the generator and the jet, which is filled with pumice-stone, moistened with a strong solution of caustic potash. The object of this alkali is to absorb the sulphuretted hydrogen which may be present, and which would interfere with the coloration of the flame.

The most important point, however, appears to be that the presence of a large number of organic substances interfere with the action of the test. Alcohol, ether, and analogous substances, are especially mischievous in this respect. They may, however, be got rid of by previously boiling the liquid. But animal and albuminous matters are also, more or less, absolute obstacles to the action of the test. M. Blondlot overcomes this difficulty by first combining the phosphorus with a metal, so as to form a phosphide, and then introducing this into the apparatus described. For this purpose the suspected matter is first filtered, and then introduced into a large hydrogen apparatus, and the gas passed through a dilute solution of nitrate of silver. A brownish precipitate is formed, which is collected, and then tested as usual; when if it contains phosphorus, the characteristic green flame is obtained.

This test might be of use in cases in which Mitscherlich's process would yield little or no result, owing to the phosphorus having undergone oxidation. In such a case, the acidulated liquid remaining in the flask might be filtered and tested in the above manner. Or if a slight and doubtful phosphorescence had been obtained, then the distillate might in like manner be tested.

In conclusion, it is to be observed that the presence of urine in no way interferes with the action of the test. M. Blondlot introduced a considerable quantity into the hydrogen apparatus without in the least affecting the colour of the flame. On the contrary, he was enabled to recognize by this means the presence of phosphorus in the urine of a patient who had been taking hypophosphite of soda. In the case of a dog, poisoned with phosphorus paste, however, the urine remaining in the bladder gave no evidence of the poison.

Reduction of Copper in Fine Powder.—M. Schiff gives the following process for obtaining copper in a state of fine division:—A saturated solution of sulphate of copper, together with some crystals of the salt, are introduced into a bottle or flask, and agitated with some granulated zinc. The zinc displaces the copper from its solution, fresh sulphate dissolving as the action goes on, until the whole is exhausted. Heat is disengaged during the operation. The precipitated copper must be washed and dried as rapidly as possible, to prevent oxidation.

On the Action of Ammonia and Atmospheric Air on Metallic Copper.—When M. Schweitzer, of Zurich, a year or two back, announced the singular fact of cellulose being soluble in ammonio-sulphate of copper, M. E. Peligot afterwards indicated that the blue solution formed by exposing metallic copper in solution of ammonia to the air was better suited for the purpose than the ammonio-sulphate. M. Peligot has recently communicated to the French Academy the results of an investigation into the nature and composition of the blue solution referred to. He had previously detected the presence in this solution of an oxygen acid of nitrogen, which he conceived might be nitrous acid resulting from the oxidation of the ammonia. This production of nitrous acid has also been observed by M. Schonbein, who, in a paper published in the German journals, has shown that by moistening spongy platinum with ammonia, nitrate of ammonia is produced, and that the same result is obtained with finely divided copper. He further states that the blue solution formed by exposing copper in ammonia, contains, besides oxide of copper, a portion of nitrate of ammonia. He did not, however, isolate from the solution any of the compounds formed.

To obtain this solution for investigation, M. Peligot took from 15 to 20 grammes of metallic copper in a state of fine division (as precipitated from its sulphate by

zinc), which was introduced into a large flask of 12 to 15 litres capacity, and moistened with 60 to 80 cubic centimetres of concentrated ammonia. The metal, thus moistened, adhered in a thin film over the sides of the vessel. In a few minutes the flask became warm, and filled with thick white fumes, which, condensed on a cold moist surface, gave all the characters of nitrate of ammonia. When the reaction had terminated, the atmosphere of the flask, which consisted of nothing but nitrogen, was changed by means of a bellows, and the contents of the flask agitated; this operation being repeated several times. Several flasks were thus charged, and at the end of the process the liquid was allowed to drain out, and the vessels rinsed with a further quantity of ammonia. Besides the blue liquid so obtained, there remained an insoluble product of an olive green, brown or yellow colour, which consisted of a mixture of the two oxides of copper, and of metal unacted on. The solution contained only a fourth or a fifth of the copper employed.

The presence of an ammoniacal salt singularly affects this reaction. By employing solution of ammonia previously saturated with sal-ammoniac, the whole of the copper is attacked in a few minutes, and if sufficient air be present, the solution of the metal takes place completely. This is due, no doubt, to the tendency of the salts of copper to combine with those of ammonia.

By evaporating with a gentle heat, or even in a vacuum, the blue solution resulting from the action of the pure ammonia on copper (without the sal-ammoniac), a residue is obtained which is not homogenous, being violet blue or green in patches. Cold water separates from it nitrate of ammonia almost free from copper; this salt, however, as is known, decomposes into water and nitrogen during concentration. If the original blue solution be boiled, it separates into black oxide of copper and nitrate of ammonia. If the dry residue resulting from its evaporation to dryness by the water-bath be treated with a boiling alcoholic solution of ammonia, the filtered liquid deposits, on cooling, prismatic needles of fine violet-blue colour, some oxide of copper remains insoluble in the alcoholic ammonia. The composition of the blue crystallized salt is represented by the formula

$$NO_3, CuO, NH_4 O, HO.$$

Submitted to a temperature of 100°, this salt assumes a green colour, and loses the whole of the water and ammonia it contains. To obtain this result, however, it requires several days' exposure to a water-bath heat. The product which remains is an anhydrous nitrate of copper—CuO, NO_3. The blue salt, the ammonio nitrate of copper, detonates when struck with a hammer on an anvil.

In contact with a small quantity of water this salt dissolves, producing much cold. By exposing the solution to spontaneous evaporation a portion of the ammonia escapes, leaving nitrate of ammonia and a green crystalline salt which has the composition ($3\ CuO, NH_4O, NO_3$).

The regular production of this salt, which the solution obtained directly from the action of ammonia and air on copper equally furnishes, is very difficult, because it is itself decomposable by a large excess of water.

Water acts, in fact, in a remarkable manner upon these different products. When a very large quantity of water is poured, either in the original blue solution or upon the two crystalline products derived therefrom, a fine turquoise blue precipitate is obtained. This precipitate is hydrated oxide of copper. This hydrate differs, however, from that obtained by ordinary processes, inasmuch as it is not affected by boiling water, and may be heated to 212° F. without alteration. It also contains traces of ammonia which cannot be removed by repeating washing. It is a fine crystalline precipitate, which slowly absorbs carbonic acid from the air, without change of colour.

M. Peligot conceives that this body, from the beauty of its colour, will find some application in the arts, and he indicates that it may be readily prepared by more simple means. Thus, the same substance is obtained when caustic potash is added to a dilute solution of sulphate of copper previously treated with a slight excess of ammonia; or by adding the alkali to a mixture of a salt of copper with a salt of ammonia. It is also formed when a large excess of water is added to a solution of slightly ammoniacal nitrate of copper.

OBSERVATIONS ON BITTER ALMOND AND CHERRY LAUREL DISTILLED WATERS.

BY MONSIEUR MAYET.

Having had occasion to distil bitter almond water, I endeavoured to study its preparation with care, in order that I might assist in the remarkable work which our honourable contemporary, M. Marias, has presented to the Society, in the name of the Distilled Waters Commission. Subjoined is the process by which this distillation was made, and its results.

One kilogramme of bitter almond cake exhausted of fixed oil, which was supplied to me by the firm of Chardin, was finely powdered, and placed in water at a temperature of 30° Centigrade for twenty-four hours; the quantity of water was sufficient to form a very clear pulp. At the end of this time this doughy mixture was submitted to distillation by vapour in an ordinary still, arranged after the modification pointed out by Soubeiran; the joints being secured by lutings of linseed meal coated with dextrine. The distillation proceeded admirably; the proceeds were collected in portions of 500 grammes.

The first product, which was milky at the time of its flowing, became clear in about two hours after, without any deposit of the essence; the others were clear during the distillation.

The quantity of hydrocyanic acid contained in each portion, which was estimated by Buignet's test, was as follows:—

The	1st	product	indicated	250	milligrammes	in	100	grammes of distilled water
"	2nd	"	"	70	"	"	"	"
"	3rd	"	"	30	"	"	"	"
"	4th	"	"	24	"	"	"	"

The first portions of a fifth product intended to be rejected, and tried only from curiosity, marked no more than 20 milligrammes.

The four first products mixed in equal proportions indicate 88 milligrammes instead of the calculated average of 93; this difference arises evidently from the circumstance that at each titrage the point of saturation is obliged to be slightly passed before perceiving the azure-blue colour which is the guide to the operator.

From this experiment it is clear to me that, while maintaining as correct the observation which I made to the Society relative to the want of resistance in the ordinary lutings of paper, the distillation may be successfully carried on by replacing them with lutings of linseed meal coated with dextrine; consequently it is not possible to question which should be preferred, the operation by vapour or that by the naked fire, for it is very evident that distillation by vapour not presenting any of the inconveniences which may be attributed to distillation at the naked fire, should be undoubtedly recommended.

In my opinion the average amount of hydrocyanic acid might be fixed at 80 milligrammes in 100 grammes of distilled water. It might be desirable to make it agree with decimal fractions, but to arrive at this I think we should be further removed from the real average, if we wish to maintain the distillation in the proportion of two parts of product for one of dry substance. I should consent more willingly to a proposition which would have for its object the arresting the distillation when one part and a half of the product had been withdrawn; in this manner, if experience should confirm what I could not really prove by the examination of a single preparation, we should arrive at obtaining about 110 milligrammes of acid for 100 grammes of distilled water, and it would then be easy to regulate the average at 100 milligrammes for 100 grammes.

As to distilled cherry laurel water, I think that we should arrive at an equally favourable result by following a method analogous to that which I have just pointed out for the distillation of bitter almond water—that is, by putting the leaves previously bruised into the water-bath for at least 12 hours, in contact with a quantity of water at 30° Centigrade equivalent to that which should be withdrawn in distillation. Experience has convinced me that the leaves of the cherry laurel exposed without water to a current of vapour will give but an inferior produce. Water distilled in this manner in the proportion of one part of leaves to one of water would only contain 20 milligrammes of acid for 100 grammes; whilst another sample of water

distilled over the naked fire contained 52 grammes. But I repeat, the question which determines my choice rests on the resistance of the lutings ; from the moment when it is possible to bring to the boiling point the water in the bath, I am in favour of the application of vapour to all distilled waters.—*Journal de Pharmacie et de Chimie*

ON THE OLEAGINOUS MATTER FORMED ON DISSOLVING DIFFERENT KINDS OF IRON IN DILUTE ACIDS.

BY EMERSON J. REYNOLDS,

Assistant-Chemist to the Dublin Chemical Society.

Proust, I believe, was the first who noticed that the hydrogen prepared by dissolving black cast iron in dilute sulphuric acid possessed a most offensive odour, and that on being passed through glass tubes, it caused them to assume a greasy appearance, apparently due to the deposition of an oily matter, which he appears to have considered as a combination of hydrogen and iron; the non-production of which body (compound of hydrogen and iron), under these circumstances, I will demonstrate further on.

Berzelius afterwards noticed the formation of this oleaginous body, and gave it as his opinion that it was a compound of carbon and hydrogen. And more recently (in 1855), Professor Cameron made some experiments on the oil, the results of which he communicated to the Dublin Chemical Society. He found it to be very volatile, and destitute of nitrogen ; and also that certain metallic salts removed the offensive odour produced by its presence.

But after all, two of the most important points have been left undetermined; namely, the precise conditions under which this body is formed, and its chemical and physical characters and relations.

Now, it is the first of these propositions that I intend dealing with in the present paper, reserving the second for a future communication. I had contemplated waiting until my researches were completed before publishing the results, but in consequence of some observations of M. Chevreul before the Academy of Sciences of Paris, I thought it better to bring forward what I have determined up to the present time.* M. Chevreul stated that the combination of the cast iron with the hydrogen was difficult to admit, and that this consideration had led him to conjecture that the water might assist in the production of the oily matter simultaneously with the carbon and hydrogen. He, moreover, considered that M. Fremy's observations seemed to throw some light on the subject, by indicating that it was not carbon, as had been represented, which yields the oily body. Now, we can clearly gather from this that M. Chevreul points to nitrogen as being possibly the principal constituent of the oil, and not carbon.

In order to come to definite conclusions, it was essentially necessary to answer the three following propositions:—

1. Is the oleaginous body produced during the solution of *pure* iron in dilute acids?

2. Does iron, free from every other impurity but *carbon*, yield the oil when treated with acids?

3. Will impure iron, containing nothing but *nitrogen*, furnish the oily matter on similar treatment?

It will be seen at a glance that the careful solution of these propositions would be certain to remove any doubts as to its origin, and make us acquainted with the circumstances which influence its production.

The following are the methods adopted for answering each question:—

1. My first object was to prepare absolutely pure iron. This I procured by the process generally employed for preparing "*fer reduit*," care being taken to preclude any possible chance of impurity; the peroxide being precipitated from the pure perchloride by ammonia. After being well washed, it was then submitted to a low red heat for some time. Even after this treatment it was tested for ammonia, but of course not a trace could be found. Moreover, the hydrogen gas used to decompose the peroxide was evolved from distilled zinc and pure dilute sulphuric acid, and

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* Vide *Chemical News*, vol. iii., page 332.

every precaution adopted to render it quite pure. The metallic iron so procured, when dissolved in pure dilute sulphuric acid, did not yield the *slightest trace* of the oil. I did not come to this conclusion after one experiment alone, but after repeated trials.

This overthrows at once the supposition that the iron combines directly with the nascent hydrogen, forming the oil, and indeed does more, for its non-formation tends to strengthen, if such confirmation were necessary, the opinion of Professor Cameron, formerly expressed in this Journal, that such a compound as ferruretted hydrogen does not exist.

2. In answering the second question, it was essential to obtain iron containing some carbon in combination; this I prepared as follows:—Light carburetted hydrogen was prepared by M. Dumas' method, and passed over the pure iron of the first experiment, heated to redness; the action was allowed to go on for half an hour. In this way I obtained iron containing carbon, in fact, cast iron. This compound, when dissolved in acids, gave the oil in such quantity, as to allow of its being identified with the greatest ease. This experiment proves with certainty that carbon is essential to the existence of the oil, though, of course, it does not furnish us with any information as to whether the elements of water enter into its constitution or not; this can only be found by its ultimate analysis.

3. The third point to be considered in connexion with this subject is, whether or not nitrogen gives rise to any oil. To determine this, another portion of the iron of experiment 1 was submitted to the action of dry ammoniacal gas for nearly two hours and a half, by which means it became highly nitrogenized (as was proved by the abundant evolution of ammonia on heating it in an atmosphere of hydrogen). This body, which is readily attacked by dilute sulphuric acid, does *not*, when so acted on, give the least trace of oleaginous matter; of this I have fully satisfied myself. Indeed, if confirmation were necessary, it is found in the fact that the oil, whatever its source may be, does not contain nitrogen.

To sum up then; my experiments show the following:—

1. Pure iron does not yield the oil.
2. Iron containing *carbon* alone does give the oil.
3. Iron containing *nitrogen* alone does not furnish the oleaginous matter.

So far for the origin of this curious body; it now remains for me to determine by analysis its composition, &c. On this subject I am actively engaged at present, and hope to turn to some account the experimental results which I have arrived at in this paper, so as to furnish me with a means of preparing this oil in larger quantity than I have heretofore obtained it.—*Dublin Hospital Gazette.*

NOTE ON A CASE OF POISONING BY THE BERRIES OF *SOLANUM PSEUDO-CAPSICUM.*

BY M. MONTANÉ, OF MOISSAC.

The *Solanum pseudo-capsicum* is frequently cultivated as an ornamental plant, on account of the coralline colour of its fruits. Gardeners give it the name of *cerisette*, probably because its berries resemble the cherry improperly called *guigne* in our country. This resemblance and the common name do not fail to deceive children, generally very partial to fruits of a red colour, particularly cherries; and cases of poisoning produced by this fruit are often registered.

Some years since, a child five years old died at Moissac, after having eaten some berries of this species of *Solanum*. A similar case of poisoning occurred last week in a child of four years old. Three or four berries were sufficient to cause the most serious symptoms: nausea with drowsiness, very severe hypogastric pains, dilatation of the pupils, &c. Called in by the parents, it was easy for me to explain the state of the invalid, on hearing that he had just eaten some *cerisettes*. I hastened to induce vomiting whilst waiting the arrival of the physician. After the invalid had vomited some portions of the berries mixed with food, poultices were applied to the legs by the doctor, who, at the same time, administered a strong infusion of coffee. The unpleasant symptoms ceased after three hours of the most assiduous attentions.

As there is no mention made of the *Solanum pseudo-capsicum* in materia medica works, I think it will be useful to point out here its characteristics, and thus avoid researches often made with difficulty at the time of an accident.

It is a shrub of from sixty centimetres to one metre in height, always green, branched, branches straight, and so disposed as to give the plant the form of an elongated ovoid; leaves lanceolate, petiolate; flowers of a dirty white colour, placed generally in umbels, each of which contains three or four flowers, sometimes single; berries resembling in shape and colour those of the *Physalis alkekengi*,* slightly sweet in taste; seeds from three to four millimetres in length, irregularly oval, hollowed out or almost reniform, slightly wrinkled at the borders, thicker and of a deeper yellow at the circumference.—*Bulletin de la Soc. de Pharm. de Bordeaux*, and *L'Union Pharmaceutique*, July, 1861.

ON OIL OF SESAMUM (*SESAMUM ORIENTALE*), AND ITS EMPLOYMENT IN PHARMACY.

BY M. ROTH, OF MULHOUSE.

Olive oil is expensive and almost always adulterated. Its use, which is prescribed by the Codex, increases unnecessarily the price of pharmaceutical preparations in which it enters, which are almost always intended for external use. Now, when we are so actively engaged in investigations in preparation for the new Codex, it is desirable to draw attention to those oils which are met with in commerce, and which might be advantageously substituted for olive oil. Amongst these oils there is one that at once recommends itself by its excellent qualities—it is that of *sesamum*. At the present time much in request, especially in the East, its consumption tends more and more to replace that of olive. It is good to eat, less coloured than olive oil, less liable to congeal, to become rancid, and to thicken, and is, moreover, much less in price. It may, indeed, be obtained at present from 1 fr. 60 c. to 1 fr. 80 c. the kilogramme. It is good for all pharmaceutical purposes, and the various preparations tried have perfectly justified its use. Subjoined is a formula for an excellent cerate, which is in no respect inferior to that of the Codex:—

Oil of sesamum	1.200 grammes
White wax	350 "
Water	750 "

In winter, omit a little of the wax.—*L'Union Pharmaceutique*, July, 1861.

ON ANACAHUITE WOOD.

BY BERTHOLD SEEMANN, PH.D.

During the last two years, public attention has been directed to a new Mexican drug, imported from Tampico, under the name of Anacahuite wood, and recommended as a remedy for consumption. Shavings of the wood are administered in the simple form of infusion, to be drunk in the morning fasting, and again in the

* A person presented me, some time since, a certain number of berries, which she said were purgative. I took them at first for those of the *Physalis alkekengi*, but I soon discovered my error on perceiving that the calyx still adhered to the fruit, thus presenting a very different appearance to that of the *Physalis*, which is remarkable for its inflated character. A closer examination proved to me that these berries were those of the *Solanum pseudo-capsicum*.

With the exception of the calyx, I confess that it is difficult to determine at first sight any remarkable difference between these two fruits. The berries of the *Solanum pseudo-capsicum* have, it is true, a sickly and rather sweet taste, whilst those of the *Physalis alkekengi* are tart and rather bitter. But these are insufficient characteristics. Those which are supplied by the seeds are of higher value. The seeds of the *Physalis alkekengi* may always be distinguished from those of the *Solanum pseudo-capsicum* by the following characteristics:—Seeds about two millimetres in circumference, oval, lenticular, slightly hollowed out, of a yellow citron colour, not bordered at the circumference.

It is indispensable, in a case of poisoning with the berries of the *Solanum*, to collect the seeds which may be found in the vomited matters, in order to be certain as to what species they belong.

evening at bedtime. Even when the disease has already made some progress, this infusion is considered highly beneficial; at least, that is its Mexican reputation. The experiments made at the Berlin Hospitals have hitherto had no satisfactory result, and many already begin to doubt the efficacy of the wood, at least in our northern latitudes. However, the demand for the drug is steadily increasing, and yet no botanist has been able to say what species of plant produces this new article to our import list. Perhaps some of your correspondents or readers may be able to aid us in clearing up the doubts surrounding this question; and that is one of the chief reasons why I trouble you with these lines. Dr. Berg, who has given a very elaborate account of the wood (*Bonplandia*, vol. viii., p. 302), thought it might possibly be derived from some papilionaceous tree; but as he had no specimens of the leaves, flowers, or fruit, his opinion is founded solely upon the structure of the wood itself. Some time ago, I pointed out that the name of Anacahuite is not to be found in any Aztec vocabulary, even the most recent; nor is it mentioned in the work of Hernandez. There was, therefore, every reason for assuming the name to be a corruption. Hanbury (*Pharm. Journ.* for Feb., 1861) seems to have arrived at the same conclusion, and conjectured that the name of "Nanahuaquahuitl, seu Morbi Gallici arbor," to be found in Hernandez, might be a possible version of Anacahuite. "Cahuite" is simply a Spanish corruption of Quahuitl = tree, which always occurs in that form in modern Mexican names; but I am unable to say what "Ana" may be traced back to. Hernandez gives a brief description of this plant, and a rude woodcut; according to which, it is a large tree with alternate, simple, lanceolate or elliptical leaves, said to be slightly scented and bitter; and "*decorti jus matutino liberalius ebibitum, Gallico medetur morbo.*" Of course, nothing can be made out of this account in the present state of the case; but it may become intelligible when we shall have received specimens and more information from Mexico. Mr. Alexander Smith, at Kew, a few days ago directed my attention to Emory's Report, ii., p. 135, where Dr. Torrey, on enumerating *Cordia Boissieri*, Alp. de Cand. (found by Edwards and Gregg near Monterey, by Thurber at New Leon, by Schott on the Rio Grande, all places on the east coast of Mexico, a few degrees north of Tampico, whence we obtain the wood), says: "The Mexicans call this plant 'Nacahuita.' Dr. Gregg says that the fruit is eaten by cattle and hogs, and that a decoction of the leaves is used for pains in the limbs." The two names (Anacahuite and Nacahuita) are sufficiently alike to justify further inquiry. At the same time, it is necessary to state that there is only a distant resemblance between the leaves of *Cordia Boissieri*, of which there are fine specimens in Sir W. J. Hooker's herbarium, and the rude woodcut furnished in the Roman edition of Hernandez's work, leaving it quite an open question whether the two be identical or distinct.—*The Technologist.*

NORWEGIAN CASTOR.

At a meeting of the Medical Society of Christiana, M. Ditten, Pharmacien, exhibited two sacs of fresh Castor, each of which weighed 125 grammes. He had bought them of a Norwegian peasant, who had six others in his possession, and who told him that he frequently took *Castors* in the environs of the village in which he lived.

Professor Holst observed on this occasion, that the interior cavity, which had long been considered as the distinctive character of the Siberian Castor, to which Norwegian Castor must be connected, was wanting in the two sacs presented by M. Ditten; but it had been recently shown that the formation of this cavity depended upon the mode in which Castor was dried. The smell and taste peculiar to Siberian Castor alone constitute its certain characteristics. When the Siberian Castor has attained its full development, and when taken in one of the first months of the year, a pair of sacs will weigh 375 grammes. The Castor thrives best in desert and wild countries; the increase of population and the extension given in Norway to agriculture will render the Castor more and more rare in that country.—*Archiv. for Pharm. og Technisch. Chem.*, and *Journal de Chimie Médicale.*

ARSENIOUS ACID IN LARGE DOSES: A SUBSTITUTE FOR QUININE.

BY J. TURNER, SURGEON TO H.M. BRIGADE, BOMBAY HORSE ARTILLERY.

(*Communicated to the Royal Medical and Chirurgical Society.*)

THE author has employed arsenious acid for twenty years in the treatment of intermittent fevers, and on account of the great drain upon the cinchona-tree, its failure in India, and his strong opinion as to the equal if not greater value of arsenious acid in the above-named diseases, he now brings the results of his experience before the profession. He considers the fears of an inconvenience or danger arising from the remedy as much exaggerated, and instances the case of a child of nine months, to whom he gave twenty minims of the arsenite of potash* within ten hours, repeating the dose on the following day, with the only effect of curing an obstinate quotidian intermittent. Mr. Turner's success was so marked, that in 1860 the Director-General stated that Mr. Turner should be thanked for "drawing attention to his successful treatment of intermittent fevers by large doses of arsenic, and steps should be taken by circular to urge an extended trial of this remedy, and reports requested." The course usually adopted by the author was to give the arsenite of potash as in the following prescription:—Arsenite of potash and compound tincture of cardamoms, of each half a drachm; gum mucilage, three drachms; camphor mixture or water, half an ounce: mix. To be given every second hour four or five times, the last to anticipate the expected paroxysm at least two hours.

ON THE COLOURING MATTERS DERIVED FROM COAL-TAR.

The following paper by Mr. PERKIN was read before the Chemical Society, May 16, 1861:—

The subject which I have the honour of bringing before you this evening is one which is remarkable for the very rapid progress it is making. Previous to the year 1856 the colouring matters derived from coal-tar products were practically unknown; but owing to recent discoveries they are now enumerated amongst the most important colouring matters employed. It is not my intention to enter into a discussion respecting the numerous patents that have been taken out for the production and application of coal-tar colours, nor yet to enter into the practical details of their manufacture; but to notice more particularly their various chemical characters, and also to speak of the methods employed for their application to the arts. I shall endeavour to bring before you all the principal coloured products obtainable from the derivatives of coal-tar—both those which are practically employed by the dyer and printer, as well as those which still remain as chemical curiosities only. I may mention that the latter class of compounds is more extensive than the former, and also that many of the colouring matters in it are likely to remain so, for reasons to be mentioned presently.

The coal-tar products which have, up to the present, yielded colouring matters are numerous. The following is a list of the most important, which are obtained either directly or indirectly from coal-tar; namely, aniline and its homologues, carbolic acid, chinoline or quinoline, naphthaline, and pyrole bases.

I will commence by speaking of the first and most important of these products, and its derivatives,—namely, Aniline.

Aniline was discovered in 1826 by Unverdorben. The original method for its preparation was by digesting indigo with hydrate of potassium, and subjecting the resulting product to distillation. Aniline was also obtained from the basic oils of coal-tar; but the process which is now employed for its preparation is a remarkable instance of the manner in which abstract scientific research becomes, in the course of time, of the most important practical service. It was Faraday who first discovered benzole; he found it in oil-gas. After this it was obtained by distilling benzoic acid with baryta, which result determined its formula, and was the cause of it being called *benzole*. After this, Mansfield found it to exist in large quantities in common coal-tar naphtha, which is the source from which it is now obtained in very large quantities. Benzole, when studied in the laboratory, was found to yield, under

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* Of course *liquor potassæ arsenitis* is intended.—ED. *Pharm. Journ.*

the influence of nitric acid, nitro-benzole. Zinin afterwards discovered the remarkable reaction which sulphide of ammonium exerts upon nitro-benzole, converting it into aniline. And, lastly, Béchamp found that nitro-benzole was converted into aniline when submitted to the action of ferrous acetate. It is Béchamp's process which is now employed for the preparation of aniline by the ton. Had it not been for the investigations briefly cited above, the beautiful aniline colours now so extensively employed, would still remain unknown. When I discovered aniline purple, nitro-benzole and aniline were only to be met with in the laboratory; in fact, half a pound of aniline was then esteemed quite a treasure, and it was not until a great deal of time and money had been expended that I succeeded in obtaining this substance in large quantities, and at a price sufficiently low for commercial purposes.

The colouring matters obtainable from aniline are numerous. They are the following:—Aniline purple, violine, roseine, fuchsine, alpha aniline purple, bleu de Paris, nitroso-phenyline, dinitraniline, and nitro-phenyline diamine.

Aniline Purple, generally known as Tyrian Purple, Mauve, Phenamine, Indisine, &c.—It has been known for many years that the hypochlorites react on aniline and its salts, producing a purple-coloured solution; in fact, hypochlorites are the distinguishing test for aniline; but nothing definite was known of this purple-coloured solution, it being simply stated that aniline produced with hypochlorites a purple-coloured liquid, but that this colour was very fugitive. As many very absurd statements have been made respecting the discovery of aniline purple, I will just briefly mention how it was that I first became acquainted with it.

In the early part of 1856 I commenced an investigation on the artificial formation of quinine. To obtain this base I proposed to act on toluidine with iodide of allyle, so as to form allyle-toluidine, which has the formula

$$\left.\begin{matrix} C_7H_7 \\ C_3H_5 \\ H \end{matrix}\right\} N = C_{10}H_{13}N,$$

thinking it not improbable that by oxidizing this I might obtain the desired result, thus

$$\underbrace{2\,(C_{10}H_{13}N)}_{\text{Allyle-toluidine.}} + O_3 = \underbrace{C_{20}H_{24}N_2O_2}_{\text{Quinine.}} + H_2O.$$

For this purpose I mixed the neutral sulphate of allyle-toluidine with bichromate of potassium; but instead of quinine I obtained a dirty reddish-brown precipitate. Nevertheless, being anxious to know more about this curious reaction, I proceeded to examine a more simple base under the same circumstances. For this purpose I selected aniline, and treated its sulphate with bichromate of potassium. This mixture produced nothing but a very unpromising black precipitate; but on investigating this precipitate I found it to contain the substance which is now, I may say, a commercial necessity, namely, aniline purple.

The method adopted for the preparation of aniline purple is as follows:—Solutions of equivalent proportions of sulphate of aniline and bichromate of potassium are mixed, and allowed to stand till the reaction is complete. The resulting black precipitate is then thrown on a filter and washed with water until free from sulphate of potassium. It is then dried. This dry product is afterwards digested several times with coal-tar naphtha until all resinous matter is separated, and the naphtha ceases to be coloured brown. After this, it is repeatedly boiled with alcohol to extract the colouring matter. This alcoholic solution when distilled leaves the colouring matter in the bottom of the retort as a beautiful bronze coloured substance.

The aniline purple prepared according to the process just described, although suitable for practical purposes, is not chemically pure. If required pure it is best to boil it in a large quantity of water, then filter the resulting coloured solution, and precipitate the colouring matter from it by means of an alkali. The precipitate thus obtained should be collected on a filter, washed with water until free from alkali, and dried. When dried it is to be dissolved in absolute alcohol, the resulting solution filtered, and then evaporated to dryness over the water-bath. Thus obtained, aniline purple appears as a brittle substance, having a beautiful bronze coloured surface, but if some of its alcoholic solution be evaporated on a glass plate, and viewed by

transmitted light, it appears a beautiful bluish violet colour. If considerable quantities of an alcoholic solution of the colouring matter, containing a little water, be evaporated to dryness, the surface of the colouring matter next to the evaporating dish when detached, often possesses a golden green appearance. Aniline purple is difficultly soluble in cold water, although it imparts a deep purple colour to that liquid. It is more soluble in hot water, but its hot aqueous solution when left to cool assumes the form of a purple jelly. It is very soluble in alcohols, though nearly insoluble in ether and hydrocarbons. Aniline dissolves it readily. In properties it seems to be slightly basic, as it is more soluble in acidulated than in pure water. Alkalies and saline substances precipitate it from its aqueous solution as a dark purplish-black powder. Bichloride of mercury precipitates it in a very finely divided state. A little of this precipitate, which appears to be a double compound of chloride of mercury and colouring matter, when suspended in water and viewed by transmitted light, appears of a blue or violet colour. If a small quantity of hydrate of potassium or sodium be added to an alcoholic solution of the colouring matter, it causes it to assume a violet tint, but without affecting any change in the colouring matter itself. Ebullition with alcoholic potash does not decompose it. Aniline purple dissolves in concentrated sulphuric acid forming a dirty green solution. This, when slightly diluted, assumes a beautiful blue colour. Excess of water restores it to its original purple colour. I have had a specimen of this colouring matter heated for an hour to 100° Centigrade with Nordhausen sulphuric acid without suffering decomposition, being restored to its original colour by means of water, and possessing precisely the same properties as it had before being subjected to this powerful agent. Hydrochloric acid acts upon it in the same manner as sulphuric acid. It is decomposed by chlorine, and also by fuming nitric acid. Bichloride of tin is without action upon it. Powerful reducing agents have a peculiar action upon this colouring matter, somewhat analogous to the action of reducing agents on indigo. An alcoholic solution of sulphide of ammonium, when mixed with an alcoholic solution of the colouring matter, causes it to assume a pale slightly brownish colour. This solution when brought in contact with the atmosphere instantly assumes its beauty and intensity of colour. An alcoholic solution of the colouring matter when mixed with a little protoxide of iron changes to a pale brown colour. This solution also becomes purple when exposed to the action of the atmosphere. Sulphurous acid does not affect the colour of this substance.

This colouring matter forms a remarkable compound with tannin. When an aqueous solution of the colouring matter is mixed with a solution of tannin, precipitation takes place. The precipitate thus formed, after having been well washed, no longer possesses the properties of the pure colouring matter. It is insoluble in water. Like the pure colouring matter it dissolves in concentrated sulphuric acid, forming a dirty green liquid; but on adding an excess of water to this solution the new compound is precipitated unchanged. This compound is rather duller in colour than the pure colouring matter itself. Aniline purple, when agitated with a little moist binoxide of lead, is transformed into roseine. This colouring matter is remarkable for its intensity, a few grains of it colouring a considerable quantity of spirits of wine.

Violine.—This colouring matter, which is a product of the oxidation of aniline, was first obtained by Dr. David Price. He prepares it by heating an aqueous liquid containing two equivalents of sulphuric acid, and one equivalent of aniline, to the boiling point, and then adding one equivalent of binoxide of lead, boiling the mixture for some time and filtering it whilst hot. The filtrate, which is of a dark purple hue, is boiled with potash, both to separate the excess of aniline, and also to precipitate the colouring matter. When all the free aniline is volatilized, the residue is thrown on a filter and slightly washed with water, and then dissolved in a dilute solution of tartaric acid. This solution, after filtration, is evaporated to a small bulk, re-filtered, and then precipitated by means of an alkali. Thus obtained, violine presents itself as a blackish-purple powder, which, when dissolved in alcohol and evaporated to dryness, appears as a brittle, bronze-coloured substance, similar to aniline purple, but possessing a more coppery-coloured reflexion. It is more insoluble in water than the preceding colouring matter; it is very soluble in alcohol, but insoluble in ether and hydrocarbons. These solutions possess a colour some-

what similar to that of the field violet. Concentrated sulphuric acid dissolves it, forming a green solution, but excess of water restores it to its original colour. Like aniline purple, reducing agents deprive it of its colour, but which is restored by the action of the atmospherc. Tannin produces an insoluble compound with it; when agitated with a small quantity of binoxide of lead it is converted into aniline purple; excess of this reagent changes it into roseine.

Roseine.—This substance nearly always accompanies aniline purple, though in very small quantities. It was first noticed publicly by C. Greville Williams, and afterwards by Dr. David Pricc. Williams used manganates for its preparation, but Dr. David Price prepared it by means of binoxide of lead. His process is as follows:—To a boiling solution of one equivalent of sulphate of aniline, two equivalents of binoxide of lead are added, and the mixture boiled for a short time. The rose-coloured solution is then filtered, and the filtrate evaporated to a small bulk, which causes a certain amount of resinous matter to be separated. This evaporated solution is then filtered, and the colouring matter precipitated by means of an alkali; it is then collected on a filter, slightly washed, and then dried. The colouring matter thus preparcd readily dissolves in alcohol, forming a fine crimson-coloured liquid, which, when evaporated to dryness, leaves the colouring matter as a dark brittle substance, having a slightly metallic reflexion. It is much more soluble in water than either aniline purple or violine, but, like them, it is insoluble in hydrocarbons, and is morc soluble in acids than in neutral liquids. Concentrated sulphuric acid dissolves it, forming a green solution; excess of water restores it to its original colour. It forms a compound with tannin, and is also deodorized, or nearly so, by powerful rcducing agents.

The three colouring matters just mentioned—namely, aniline purple, violine, and roseine—are evidently closely allied, for they have nearly the same properties. They are all formed under similar circumstances—namely, by the action of oxidizing agents in the presence of water; they are all slightly soluble in water, though as the shade of colour becomes redder, so their solubility increases; alkalies precipitate them from their aqueous solutions; concentrated sulphuric acid dissolves them, forming green solutions, which excess of water restores to the original colour of the colouring matters; powerful reducing agents deprive them of their colour, or nearly so, but it is again restored by the influence of oxygen; and, lastly, tannin forms insoluble compounds with them all.

Fuchsine or Magenta.—This beautiful product, which is often improperly called rosine, is a member of an entirely different series of compounds from the foregoing, being formed under very different circumstances, and possessing very different properties. This colouring matter was first observed by Natanson, in 1856, when studying the action of chloride of ethylene on aniline, and afterwards, shortly before it was practically introduced into the arts, by Dr. Hofmann, when preparing cyantriphenyle-diamine by the action of bichloride of carbon on aniline. It was M. Verguin who first brought it forward as a dyeing agent, and who, I believe, taught manufacturers how to prepare it on the large scale. Fuchsine is invariably formed at a temperature ranging from 170° to 190° Centigrade. It is produced from aniline by the action of reducible chlorinized, brominized, iodized, or fluorized substances, as well as by weak oxidizing agents. The substances used for its preparation on the large scale are perchlorides of tin and of mercury, and the nitrates of mercury. It has also been prepared with bichloride of carbon.

Preparation of Fuchsine by the Action of Bichloride of Tin on Aniline.—Aniline combines with bichloride of tin, evidently producing a double compound. This product is a white substance, and may be prepared by adding to aniline, bichloride of tin in the anhydrous state or dissolved in water. Anhydrous bichloride of tin combines with anilinc with great energy to form this compound. To prepare fuchsine from this double compound it is necessary that it should be free from water, or nearly so; therefore anhydrous bichloride of tin is generally employed for its preparation. The process adopted is as follows:—Anhydrous bichloride of tin is slowly added to an excess of aniline, the mixture being constantly stirred, and the pasty mass thus formed gradually heated. As the temperature increases it becomes quite liquid and also brown in colour. As soon as the temperature nearly approaches the boiling point of the mixture, it rapidly changes to a black-looking liquid, which,

when viewed in thin layers, presents a rich crimson colour. This is kept at its boiling point some time, and then well boiled with a large quantity of water. By this means the principal part of the colouring matter is extracted, together with considerable quantities of hydrochloride of aniline. The residue is a solid of brown colour, and contains considerable quantities of tin in the form of a proto-compound. The aqueous solution of the colouring matter and hydrochlorate of aniline is then boiled, so as to volatilize any free aniline it may contain, and then saturated with chloride of sodium. The chloride of sodium causes the colouring matter to separate as a semi-solid pitchy substance, of a golden green aspect, while the hydrochlorate of aniline remains in solution. The colouring matter thus obtained may be further purified by digestion with benzole, which dissolves out a certain amount of resinous matter.

Preparation of Fuchsine by the Action of Nitrate of Mercury on Aniline.—When protonitrate of mercury is left in contact with aniline for some time, it forms a white pasty mass; but when carefully heated to 170° or 180° Centigrade it reacts upon it, forming a brown liquid, which gradually changes till of a dark crimson colour. At the same time, the whole of the metal of the mercury salt collects at the bottom of the vessel the experiment is conducted in. This product, when separated from the metallic mercury and allowed to cool, becomes semi-solid, being filled with crystals of nitrate of aniline. To purify this product it is best to dissolve out the nitrate of aniline it contains in a small quantity of cold water, and then to boil the remaining product several times with fresh quantities of water, until the principle of the colouring matter is extracted, and filter the resulting aqueous solutions while hot. On cooling, the solutions will deposit the colouring matter as a golden-green tarry substance, from which benzole separates a small quantity of a brown impurity, leaving the colouring matter as a brittle solid.

I have briefly described the above processes, because they may to some extent be regarded as types of most of the methods employed for the production of this colouring matter, the first representing its formation by the action of reducible chlorides upon aniline, and the latter by the influence of weak oxidizing agents.

Fuchsine is undoubtedly an organic base, and a more powerful one than is generally supposed. The product obtained from aniline by means of bichloride of tin is hydrochlorate of fuchsine, and that obtained by the oxidizing action of nitrate of mercury is the nitrate of fuchsine. My reason for stating this is, that on examining the colouring matter obtained by chloride of tin, I found it to contain large quantities of combined hydrochloric acid, and when nitrate of mercury was used, considerable quantities of combined nitric acid; therefore I conclude that the former is the hydrochlorate and the latter the nitrate.

Fuchsine is separated from its salts by precipitation with a small quantity of ammonia. When freshly precipitated, fuchsine is a red bulky paste, which, when dry, contracts, forming a purplish red powder. It is difficultly soluble in water, though tolerably soluble in alcohol; it is not soluble in ether or hydrocarbons; a small quantity of hydrochloric acid causes it to dissolve freely in hot water; but an excess of either hydrochloric acid or sulphuric acid dissolves it, forming a brownish yellow liquid from which ammonia separates it unchanged. By this reaction it may be distinguished from rosine, which dissolves in strong sulphuric acid, producing a green liquid. Caustic alkalies, or ammonia in excess, partially precipitate fuchsine from its salts; but at the same time dissolve a considerable quantity of it, forming nearly colourless liquids. Acetic acid added to these alkaline solutions restores the colour of the fuchsine; and if the liquids are concentrated, the base precipitates as a red, flocculent substance. An alcoholic solution of fuchsine when evaporated to dryness, leaves the colouring matter as a brittle mass, having a remarkably beautiful golden green metallic reflexion. By transmitted light it has a red colour. M. Béchamp has analyzed carefully-prepared specimens of fuchsine, and found it to have the formula $C_{12}\ H_{12}\ N_2\ O$. This hydrochlorate he found to contain an amount of hydrochloric acid corresponding with the formula $C_{12}\ H_{12}\ N_2\ O, H\ Cl$. He also examined the hydro-chloro-platinate, which is a purple precipitate; it has the formula $C_{12}\ H_{12}\ N_2\ O\ H\ Pt\ Cl_3$. The existence of oxygen in this base is remarkable, because in many instances it is produced from agents which do not contain a trace of oxygen, as, for example, bichloride of tin and aniline. The

only way I can account for the presence of oxygen in the product analyzed is, that it was a hydrate; thus:—

$$\underbrace{C_{12}\,H_{12}\,N_2\,O}_{\text{Béchamp's fuchsine.}} = \underbrace{C_{12}\,H_{10}\,N_2}_{\text{Anhydrous fuchsine.}} + \underbrace{H_2\,O.}_{\text{Water.}}$$

This is, perhaps, to some extent confirmed by an experiment I made with iodaniline. I find that iodaniline, when heated, yields fuchsine. This change can only be expressed thus:—

$$2\,\underbrace{(C_6\,[H_6\,I]\,N)}_{\text{Iodaniline.}} = \underbrace{C_{12}\,H_{10}\,N_2}_{\text{Anhydrous fuchsine.}} + 2\,HI.$$

But supposing the fuchsine examined by M. Béchamp to have been a hydrate, it is remarkable that its hydrochlorate, and more particularly its hydro-chloro-platinate, should also be hydrates. But as our knowledge of this body is as yet but scanty, we must wait for the accumulation of facts before we can form any fixed opinion respecting its constitution. The compounds investigated by M. Béchamp appear to be uncrystallizable. Some time back, I had upwards of 100 gallons of a hot aqueous solution of this colouring matter, which had been prepared by means of nitrate of mercury. This solution, on standing until cold, deposited a considerable quantity of colouring matter in the form of small octahedra, having a most beautiful green metallic reflexion. Reducing agents decolorize fuchsine, but the oxygen of the atmosphere restores it to its original colour. If an alcoholic solution of fuchsine be left in contact with sulphide of ammonium until decolorized, or nearly so, and then exposed to the atmosphere, its colour is immediately restored; but if left to stand for several days and then subjected to the atmosphere, several hours elapse before it assumes its original colour. Like aniline purple, fuchsine is a very intense colouring matter. Tannin precipitates both fuchsine and its salts, forming difficultly soluble substances. Bichloride of mercury also precipitates this base and its salts, forming double compounds. When preparing fuchsine by means of bichloride of tin, or more particularly when using nitrate of mercury, there are two other colouring matters produced, one possessing an orange colour, and the other a purple hue. It is on account of the presence of the former that some samples of commercial fuchsine possess a scarlet character of colour. Of this orange colouring matter scarcely anything is known. It is not precipitated from these salts by means of alkalies. Of the purple colouring matter little also is known. It is formed at the same time as fuchsine, but in very small quantities, and from which it is difficult to separate perfectly. Its properties are similar to those of fuchsine. It dissolves in concentrated sulphuric acid, forming a reddish-brown solution, from which part of the colouring matter is separated by dilution with water. Hydrochloric acid dissolves it, forming a dirty yellowish-red liquid.

Bleu de Paris.—This is yet another colouring matter produced under circumstances similar to those which give rise to fuchsine. MM. Persoz, V. de Luynes, and Salvétat give the following account of its preparation and properties:—"9 grammes of bichloride of tin and 16 grammes of aniline, heated for 30 hours to a temperature of about 180° Centigrade, in a sealed tube, produce neither ared nor a violet, but a very pure and lively blue. This blue, which resists acids, darkens in colour by alkalies, but passes to a groselle violet when submitted to this agent in a concentrated state. It preserves its beauty of colour by artificial light, and it dyes animal fibres of a shade whose beauty leaves nothing to be desired." I repeated the above experiment twice, and was inclined to give up in despair, for instead of a fine blue I obtained nothing more than a dirty green product. But from this unpromising product I at last succeeded in obtaining this beautiful blue colouring matter, and found it to possess all the properties mentioned above. MM. Persoz, V. de Luynes, and Salvétat, have lately given a more particular account of this colouring matter. They describe it as crystallizing from the alcoholic solution in the form of fine needles, having an aspect similar to that of ammoniacal sulphate of copper. It is soluble in water, alcohol, wood-spirit, and acetic acid; but insoluble in ether and bisulphide of carbon. With concentrated sulphuric acid it forms an amber-coloured solution which water converts into a magnificent blue liquid. Strong nitric acid decomposes it, chromic acid precipitates it from its aqueous solutions without decomposition; chlorine

destroys it; sulphurous acid does not decolorize it. I found that sulphide of ammonium is also without action upon it. It is precipitated from its aqueous solutions by alkalies and saline compounds.

Aniline Green, or Emeraldine.—Most chemists who have worked with aniline in the laboratory must have noticed the peculiar green-coloured substance which forms on the outside of the various species of chemical apparatus that have been standing in the vicinity of any quantity of this body. This product is aniline green. Aniline green has been known for several years. It may be formed by various processes. One process consists in oxidizing aniline with chloric acid. This is effected by mixing a hydrochloric acid solution of aniline with chlorate of potassium. It may also be obtained by oxidizing a salt of aniline with perchloride of iron. Obtained by either of these processes it presents itself as a dull green precipitate, which, when dried, assumes an olive-green colour. It is insoluble in water, alcohol, ether, and benzole; sulphuric acid dissolves it, forming a dirty purple-coloured solution, from which it is precipitated unchanged by water. With alkaline solutions it changes to a deep colour somewhat similar to indigo; but acids restore it to its original colour. The colour of aniline green is much enlivened by the presence of an excess of acid; but, unfortunately, as soon as this acid is removed it passes back to its normal colour.

The bases toluidine, xylidine, and cumidine yield colouring matters under the influence of oxidizing agents; and also when submitted to the action of reducible chlorides at high temperatures, analogous to those obtained from aniline under similar circumstances; but the results generally are not so good, the colour of the products becoming tinged with brown as the bases get higher in the series.

Nitroso-Phenyline.—This remarkable body is obtained by the action of nascent hydrogen on an alcoholic solution of di-nitrobenzole. It is represented by the formula $C_6 H_6 N_2 O$. This body is almost insoluble in water, but soluble in acids, and in alcohol, producing crimson-coloured solutions, but its colour is not nearly so brilliant as that of fuchsine. It seems gradually to decompose when kept. I have not tried any experiment with it as regards its dyeing properties.

Dinitraniline.—Dinitraniline is obtained by decomposing dinitro-phenyle citraconamide by means of carbonate of sodium. When pure, it crystallizes in yellow tables. It dissolves very sparingly in water, producing a yellow liquid. It has the formula $C_6 H_5 (N O_2) N_2$. It does not combine with acids or alkalies, although it appears to be more soluble in acidulated than in pure water. Silk can be dyed yellow with dinitraniline.

Nitrophenylene-diamine, or Nitrazophenylamine.—Dinitraniline, when submitted to the action of sulphide of ammonium, changes into this beautiful base, which crystallizes in needles of a red colour, somewhat similar in appearance to chromic acid. It dissolves in water, forming a yellow or orange-coloured solution like that of bichromate of potassium. Alcohol and ether dissolve it freely. It is not at all similar to fuchsine in its properties, as it forms salts of yellowish brown or grey colour; whereas fuchsine forms crimson ones. I mention this, because nitrophenylene-diamine has been spoken of as having properties similar to those of fuchsine. This base possesses the power of dyeing silk a very clear golden yellow colour.

Picric or Dinitrophenic Acid.—This beautiful acid was discovered as early as 1788, by Hausmann. It may be obtained by the action of heated nitric acid on a great variety of substances; the following are the names of some of them:—indigo, aniline, carbolic acid, saligenine, salicylious and salicylic acids, salicin, phlorizin, cumarin, silk, aloes, and various gum resins. It is now prepared for commercial purposes from carbolic acid, and also from certain gum resins. I have prepared it from carbolic acid on the large scale, in the following manner, with success:—As strong nitric acid acts very violently when brought in contact with carbolic acid, I have found it best to use an acid having a gravity less than 1.3, so as partially to convert the carbolic acid, and afterwards to boil it in stronger acid to change it into picric acid. On diluting the acid solution the impure picric acid precipitates. To further purify this it should be crystallized from boiling water. When preparing this product for commercial purposes, it is advantageous to let all the nitrous fumes formed in its preparation, together with a certain amount of atmospheric air, pass over a fresh quantity of carbolic acid. This will absorb them, and at the same time be converted into nitro- or dinitrophenic acid, and consequently diminish the quantity of nitric

acid required for its manufacture. When preparing picric acid from carbolic acid there is always a quantity of a yellow, resinous matter produced, and at times a considerable quantity of oxalic acid. The latter is always produced when the acid which is used to finally convert the carbolic acid is too weak, for then it rapidly decomposes the picric acid, yielding carbonic and oxalic acids. Picric acid, when pure and dry, is of a light primrose-yellow colour, crystallizing in strongly-shining lamina. It possesses an extremely bitter taste, and dissolves in water with a beautiful yellow colour. When digested with protoxide of iron in the cold it yields a brown amorphous compound, which dissolves in water with a blood-red colour. Picrate of copper is of a beautiful yellowish-green colour when in solution. If required for dyeing purposes, it may be prepared by mixing a solution of a picrate with sulphate of copper. Picric acid was introduced as a dye about five or six years since, by MM. Guinon, Marnas, and Bonney, eminent silk dyers of Lyons. Many of the cheap products sold as picric acid are of a brown colour, and consist of impure di- and tri-nitrophenic acids, and sometimes of this crude product and ground turmeric.

Rosolic Acid.—Runge first noticed this substance in 1834, when studying creosote, but it was almost lost sight of until again observed by Dr. Hugo Müller, only a short time since. He accidentally observed that when crude phenate of calcium is exposed to a moist, heated atmosphere, as that of an ordinary drying stove, it gradually changes in colour, and assumes a dark red tint. This coloration is owing to the formation of rosolate of calcium. I have lately heard that phenate of sodium undergoes a similar change. Dr. Müller prepared rosolic acid from this product in the following manner:—The crude rosolate of calcium is first boiled with a solution of carbonate of ammonia. By this means a crimson solution containing the rosolic acid is obtained. This solution is then evaporated nearly to dryness, during which process ammonia is given off, and the crimson-coloured liquid gradually changes to a yellowish red, and at the same time a dark resinous matter separates. This resinous substance is crude rosolic acid. In order to purify it, it is submitted to the following treatment, proposed by Runge:—The crude rosolic acid is dissolved in alcohol, and hydrate of calcium added in slight excess. The beautiful crimson solution which is thus formed is agitated for some time with the undissolved portion of the lime, filtered, and the filtrate diluted with water, and, lastly, the alcohol distilled off. The residuary rosolate of calcium is then decomposed with just a sufficient quantity of acetic acid, and the whole boiled until every trace of free acetic acid and still adhering alcohol is volatilized. The rosolic acid separates first as a red precipitate, but, when heated, cakes together, forming a dark brittle substance, having a greenish metallic lustre.

It may be still further purified by solution in alcohol, to which a little hydrochloric acid has been added, and precipitation with water. Pure rosolic acid is a dark amorphous substance, possessing the greenish metallic lustre of cantharides. Its powder is of a red, or rather scarlet shade, which, if rubbed with a hard, smooth body, assumes a bright gold-like lustre. In thin layers, rosolic acid presents an orange colour when viewed with transmitted light, but with reflected light a golden metallic appearance. When thrown down from an alcoholic solution with water, it forms a flocculent precipitate of a bright red colour, resembling the basic chromate of lead. Concentrated acids, as acetic, hydrochloric, and sulphuric, readily dissolve rosolic acid, forming brownish-yellow solutions from which water precipitates this acid unchanged. To cold water it imparts a bright yellow colour, and it is more soluble in hot than cold water. Alcohol and ether dissolve rosolic acid with great facility, forming orange or brownish-yellow solutions, which, on evaporation, leave it in an amorphous state. With ammonia, caustic alkalies, and caustic earths, it forms dark red compounds, which dissolve with a magnificent red colour. These compounds are very unstable. No precipitates are formed with aqueous solutions of the rosolates, with the basic acetates of lead, or with any other metallic salt; nor is any carried down by alumina, or any other metallic oxide. Dr. Müller made two combustions of rosolic acid, which yielded results that agree with the formula $C_{23}H_{22}O_4$. I and Mr. Duppa, when investigating some of the derivatives of acetic acid, found that when phenic and bromacetic acids were heated together at 120° Centigrade, two products were formed, one possessing all the properties of rosolic

acid, while the other had the character of brunolic acid. We also found that a mixture of iodine and carbolic acid when heated with formic, acetic, butyric, or valerianic acids, produce rosolic acid, or a similar substance. A mixture of carbolic acid and iodine did not give a similar result; but a black solid, containing iodine. Rosolic acid has lately been prepared on a large scale, and employed for the purpose of printing muslins. I believe it was a rosolate of magnesium that was employed for this purpose. I do not think it is now used, having been replaced by the more beautiful colouring matter fuchsine. It was fixed by means of albumen.

The Colouring Matters of Quinoline or Chinoline.—Chinoline is found associated with lepidine, cryptidine, and other of the higher nitrile bases, in the basic oils obtained from coal-tar, and also in the products obtained by distilling cinchonine with caustic alkalies. It was previously termed leucoline or quinoline; but the substance described under these two names was found to contain three or more distinct bases. These have been studied by C. Greville Williams, who has applied the name chinoline to the product which forms the principal part of the impure substance originally termed quinoline. The substance used for the production of colouring matters need not be pure chinoline, as that product originally termed quinoline is of sufficient purity for this purpose. Cinchonine appears to be the best source of chinoline, yielding, when distilled with excess of caustic alkali, 65 per cent. of this body sufficiently pure for manufacturing purposes. Chinoline yields three colouring matters—a violet, a blue, and a green. The following is an account of their preparation by C. Greville Williams:—

"In order to procure the blue colour, one part by weight of chinoline is to be boiled for ten minutes with one and a half parts of iodide of amyle. The mixture from being straw-coloured becomes deep reddish-brown, and solidifies on cooling to a mass of crystals. This product of the reaction is to be boiled for ten minutes with about six parts of water, and, when dissolved, filtered through paper. The filtered liquid is to be gently boiled in an enamelled iron pan over a small fire, and excess of ammonia gradually added. The ebullition may be prolonged with advantage for one hour, the evaporation of the liquid being compensated for by the gradual addition of weak solution of ammonia. The latter may be prepared by the admixture of equal volumes of ammonia of the density of 0.880 and distilled water. The hour having elapsed, the whole is allowed to cool, when the colour will almost entirely have precipitated, leaving the supernatant liquid nearly colourless. On pouring the fluid away (preferably through a filter, in order to retain floating particles of colour), the dish will be found to contain resinous-looking masses, which dissolve readily in alcohol, yielding a rich purplish-blue solution, which may be filtered and kept for use.

"The colour prepared as above is, as has been said, of a purplish tint, but if a purer blue be required the following modification is to be resorted to. The filtered aqueous solution of hydriodate of amyle-chinoline is, as before, to be brought to the boiling temperature, but instead of adding ammonia, a solution of caustic potash containing about one-fifth of its weight of solid potash is to be substituted. The addition is to be continued at intervals until three-fourths as much potash has been added as is equivalent to the iodine in the iodide of amyle used. The fluid may, after a quarter of an hour's ebullition, be filtered to separate the resinous colour. The product is a gorgeous blue, with scarcely any shade of red. On adding the other fourth of potash to the filtrate while gently boiling, a black mass will be precipitated containing all the red, which otherwise would have been mixed with the blue. This mass dissolves readily in alcohol, yielding a rich purple solution, containing, however, an excess of red. The alcoholic solution, on filtration, leaves on the filter a dark mass soluble in benzole, and, as sometimes prepared, affording a brilliant emerald green solution of great beauty. It is not always easy to obtain this green colour."*

The properties of chinoline violet and chinoline blue are, as far as I have been able to ascertain, identical. They are resinous substances, which present a coppery appearance by reflected light; but when in very thin layers, appear of a violet or blue colour by transmitted light. They are bases, and dissolve in acids, forming

* *Chemical News*, vol. ii., p. 219.

pale red solutions, which ammonia restores to their orginal colours. They are slightly soluble in hot water. Tannin precipitates them from their aqueous solution, apparently forming an insoluble compound. Reducing agents do not affect their shade of colour.

Of chinoline green I know but little. Greville Williams describes it as having a brilliant emerald green colour of great beauty. I have observed that when chlorine is passed through an alcoholic solution of chinoline blue, it changes into a green; but whether this is the green spoken of by Williams I am unable to state.

Naphthaline Colours.—The beautiful hydrocarbon, naphthaline, which has yielded such a long category of substances to the chemist, up to the present time has yielded nothing of practical importance to the dyer. From it the following coloured derivates have been obtained—namely, chloroxynaphthalic acid, perchloroxynaphthalic acid, carminaphtha, ninaphthalamine, nitrosonaphthaline, and naphthamein.

Chloroxynaphthalic and Perchloroxynaphthalic Acids.—These acids were discovered by Laurent. They are produced by digesting their chlorides—namely, the chloride of chloroxynaphthyle and the chloride of perchloroxynaphthyle—with an alcoholic solution of hydrate of potassium. They appear to be very difficult substances to obtain in quantity. I have not obtained satisfactory results when endeavouring to prepare them. They have the formula C_{10} (H_5 Cl) O_3, and C_{10} (H Cl_5) O_3, respectively. They are regarded with great interest as being very closely allied with alizarine, the colouring matter of madder; in fact, they are viewed as chloralizaric acid. That hypothesis is based upon the idea of alizarine having the formula C_{10} H_6 O_3; but it happens very unfortunately for this theory, that the formula of alizarine itself is still a disputed point. Chloroxynaphthalic acid is of a yellow colour. It is insoluble in water, and difficultly soluble in boiling alcohol and ether; but it dissolves in concentrated sulphuric acid. This acid is a very sensitive test for alkalies, being changed to an orange red by them. This may be shown by moistening paper with a weak alcoholic solution of this acid, drying it, and then exposing it to ammoniacal vapours. This will cause it to assume a red colour.

The chloroxynaphthalates are described as possessing great beauty, and are of yellow, orange, or crimson colours. The potassium salt is of a red crimson colour, and slightly soluble in water; the barium salt crystallizes in silky needles, having a golden reflexion. The strontium, calcium, aluminum, and lead salts are of an orange colour; the cadmium salt is a vermilion-coloured precipitate; the copper and cobalt salts are crimson; and the mercury salt is of a red brown colour. I once dyed some silk with a small quantity of chloroxynaphthalate of ammonium, which I prepared, and found it to produce a good golden yellow colour, of great stability under the influence of light. Perchloroxynaphthalic acid is a yellow crystalline body, insoluble in water, but soluble in alcohol and ether. With potash or ammonium it forms insoluble salts of red or crimson colour of great beauty.

Carminaphtha.—This colouring matter was also discovered by Laurent. It is obtained by heating naphthaline with a solution of bichromate of potassium, and then adding sulphuric or hydrochloric acid. It is described as a fine red substance, soluble in alkalies, but precipitated from its alkaline solutions by means of acids. I have never obtained this product when oxidizing naphthaline.

Ninaphthalamine.—Ninaphthalamine is a name which has been given to a remarkable base which was noticed by Laurent and Zinin; but nothing was known of its nature until re-subjected to investigation by Mr. Wood, who has both described and analyzed it and some of its salts. Its formula is C_{10} (H_8 NO) N, or naphthalamine in which H is replaced by NO. Mr. Wood prepares this base in the following manner:—Sulphuretted hydrogen is to be passed through a boiling solution of dinitronaphthaline in weak alcoholic ammonia until nearly all the alcohol has distilled off, which operation should occupy two or three hours. The residue is then to be boiled with dilute sulphuric acid, and filtered. The filtrate, on cooling, deposits an impure sulphate of ninaphthalamine in the form of brownish crystals, which are purified by recrystallization in water two or three times. I have found when crystallizing this salt that it is best to use water acidulated with sulphuric acid. When pure, this sulphate has to be decomposed with ammonia, and the resulting precipitate of ninaphthalamine washed with water. Thus obtained, ninaphthalamine appears as a bright red-coloured crystalline precipitate, which, when viewed under a lens,

appears as beautiful needles. It is very soluble in alcohol, producing a solution which, when dilute, is of an orange colour slightly tinged with brown, not nearly so pure in colour as that of nitrophenylene-diamine. It is slightly soluble in water, and possesses the power of dyeing silk with a colour somewhat similar to that of ordinary annata. With acids it produces colourless salts. Its formula is the same as that of nitroso-naphthaline, though it possesses very different properties. As a dyeing agent I do not think it would be of any value even if it could be obtained cheaply.

Nitroso-naphthaline.—This peculiar body is a product of the action of nitrous acid on naphthalamine. It is prepared by mixing a solution of hydrochlorate of naphthalamine with nitrate of potassium. From this mixture it separates as a reddish-brown precipitate. This, when washed with water on a filter and then dried, is dissolved in alcohol, filtered, and evaporated to dryness on the water-bath. Thus prepared, it is a crystalline, dark-coloured substance, having a greenish metallic reflexion. It is soluble in alcohol, and also in benzole, forming orange-red solutions. When acids are added to an alcoholic solution of nitroso-naphthaline it immediately assumes a most beautiful violet colour, as fine as any aniline purple. Alkalies restore it to its original colour. Silk may be dyed a beautiful purple shade with this substance, provided a certain quantity of hydrochloric acid or sulphuric acid be present. But what is most unfortunate is, that when the silk thus dyed is rinsed in water the colour immediately passes back to that of the pure nitroso-naphthaline, and also that the amount of acid required to keep up the purple shade, if left in the silk, rots it in a few days. Could this purple be fixed, nitroso-naphthaline would be a cheap and most useful dye. I have endeavoured to produce the sulpho-acid of nitroso-naphthaline, thinking that, if such a compound could be obtained, it would possess a purple colour because it would be an acid itself. But although sulphuric acid does dissolve it, forming a blue solution, yet no combination takes place. I also endeavoured to produce this desired result by treating sulpho-naphthalamic acid with nitrous acid, but obtained only nitroso-naphthaline, the acid of the sulpho-naphthalmic acid having apparently separated.

Naphthamein.—Piria observed that naphthalamine and its salts produced blue precipitates, afterwards becoming purple, when brought in contact with perchloride of iron, terchloride of gold, nitrate of silver, and other oxidizing agents. This product of oxidation he terms naphthamein. It is prepared by adding a solution of perchloride of iron to a solution of hydrochlorate of naphthamein. This mixture gradually changes and becomes blue, and after the lapse of a short time deposits a blue precipitate. This, when separated by means of a filter, is washed with water, which causes it to change in colour until of a reddish-brown purple. The filtrate from this substance contains proto-chloride of iron, and, according to Piria, chloride of ammonia. Naphthamein, when heated, fuses and decomposes, leaving a residue of charcoal behind. It is insoluble in water, sparingly soluble in alcohol, but more soluble in ether. It forms a blue solution with concentrated sulphuric acid, and is reprecipitated from it by water. It dissolves in concentrated acetic acid with a purple colour, and is not precipitated from this solution by means of water. Silk and cotton may be dyed with it, but the colour of this compound is so inferior as to render it useless as a dyeing agent.

Tar Red.—This colouring matter was discovered by Mr. Clift, of Manchester, in 1853. It is obtained by exposing a mixture of the more volatile parts of the basic oils of coal-tar and hypochlorite of calcium to the air for about three weeks. Of the pure colouring matter I know nothing, except that with tannin it forms an insoluble, or difficultly soluble, substance. With different mordants, it yields different colours. It seems probable that this colouring matter is derived from pyrrole.

Azuline.—This substance, which is a beautiful blue dye, has been introduced within the last six months. It was discovered by MM. Guinon, Marnas, and Bonney, of Lyons, who keep the process for its preparation a secret. It is obtained from coal-tar, but from which of its numerous derivates is not known. This colouring matter is a brittle, uncrystallizable body, possessing a coppery metallic reflexion. It is very difficultly soluble in water, but soluble in alcohol, producing a magnificent blue solution, having but a slight tinge of red. With concentrated

sulphuric acid it forms a blood-red liquid, which, when poured into an excess of water, precipitates the colouring matter unchanged. Dilute acids have no effect upon azuline. Its alcoholic solution, when mixed with an alcoholic solution of hydrate of potassium, also changes to a dull red colour. This, when diluted with water, forms a purple liquid, which is gradually restored to its original blue colour by hydrochloric acid. With excess of ammonia, the solutions of azuline change to a reddish purple colour. This ammoniacal solution, when treated with sulphide of ammonium, gradually assumes a dull, yellowish-brown colour. Iodine destroys the colour of azuline. In colour it is not quite so fine as chinoline blue, though far superior to Prussian blue.

Application of Coal-tar Colours to the Arts of Dyeing and Calico Printing.—I cannot enter fully into this subject, because not being a practical dyer or printer, I do not feel sufficiently acquainted with the various operations of the dye-house or print-works to do so, and also because the technical details of dyeing and printing operations would not, I think, interest the Society. I therefore propose to speak of the different processes employed for dyeing and printing with coal-tar colours in general terms only.

Dyeing Silk and Wool.—Silk and wool can be dyed with all the coal-tar colours with the exception of the rosolates, these fibres possessing, in most cases, a remarkable affinity, if I may so speak, for these colouring matters. Many of them, as aniline purple and violine are taken from their aqueous solutions so perfectly by these substances that the water in which they have been dissolved is left colourless; in fact, silk and wool take them up so rapidly that one of the great difficulties the dyer has to contend with is to get the fibres dyed evenly.

To Dye Silk with Aniline Purple, Violine, and Roseine.—One process is applicable for dyeing silk with either of these colouring matters, and it is a very simple one. An alcoholic solution of the colouring matter required is to be mixed with about eight times its bulk of hot water previously acidulated with tartaric acid, and then poured into the dye-bath, which consists of cold water slightly acidulated. After being well mixed, the silk is to be worked in it until of the required shade. If a bluer shade than that of the colouring matter is required, a little solution of sulpho-indigotic acid may be added to the dye-bath, or the silk may previously be dyed blue with Prussian blue, or any other blue, and then worked in the dye-bath.

To Dye Silk with Fuchsine, Picric Acid, Chinoline Blue, and Chinoline Violet.—This process is still more simple than the above, as it is simply necessary to work the silk in cold aqueous solutions of these colouring matters. With fuchsine or picric acid a little acetic acid may be used, but with chinoline colours acids must be avoided. With picric acid a very clear green colour may be obtained by adding a little sulpho-indigotic acid to the dye-bath. I may mention that violine is not of such a fine colour as that produced by aniline purple and indigo blue; and also that roseine is not such a good colour as fuchsine or Magenta.

To Dye Silk with Azuline.—The dyeing of silk with this colouring matter is far more difficult than with the preceding, requiring to go through two or three different processes. This difficulty, I believe, arises from the insolubility of azuline in water. The process generally employed is to work the silk in a solution of the colouring matter acidulated with sulphuric acid, and when of a sufficient depth, to raise the temperature of the dye-bath to the boiling point, and work the silk in it again. After this the silk is well rinsed in water until free from acid, and worked in a bath of soap lather. It is then again rinsed, and finished in a dilute acid bath.

To Dye Wool with Aniline Purple, Violine, Roseine, Fuchsine, and Chinoline Colours.—This operation is generally conducted at a temperature of 50° or 60° Centigrade, and the dye-bath is composed of nothing but a dilute aqueous solution of the colouring matter required. Acids should be avoided, or only a very small quantity used, as the resulting colours are not so fine when they are employed.

Methods of Dyeing Cotton with Coal-tar Colours.—When aniline purple was first introduced, considerable difficulty was experienced in dyeing cotton so as to obtain a colour that would resist the action of soap. Aniline purple is absorbed by vegetable fibres to a certain extent, and very beautiful colours may be obtained by simply working cotton in its aqueous solution; but when thus dyed the colours will

not stand the action of soap. I have tried the use of tin and other mordants, but without any satisfactory result.

In 1857, Mr. Puller, of Perth, and myself simultaneously discovered a process by which this colouring matter could be fixed upon vegetable fibres so as to resist the action of soap. This proeess is based upon the formation of an insoluble compound of the colouring matter with tannin and a metallic base in the fibre. To effect this the cotton has to be soaked in a decoction of sumac, galls, or any other substance rich in tannin, for an hour or two, and then passed into a weak solution of stannate of sodium, and worked in it for about an hour. It is then wrung out, turned in a dilute acid liquor, and then rinsed in water. Cotton thus prepared is of a pale yellow colour, and has a remarkable power of combining with aniline purple.

The above process may be modified: for example, the stannate of sodium may be applied to the cotton before the tannin, and alum may also be used in the place of stannate of sodium. To dye this prepared cotton with aniline purple it is only necessary to work it in an acidulated solution of the colouring matter; and when thus prepared the cotton will absorb all the colouring matter of the dye-bath, leaving the water perfectly colourless. It has been found that cotton thus prepared can be dyed with any colouring matter that forms insoluble compounds with tannin; therefore it is used for dyeing with rosine, violine, fuchsine, and chinoline colours.

Cotton may also be dyed a very good and fast colour by mordanting it with a basic lead salt and then working it in hot solution of soap to which aniline purple has been added. Oiled cotton, such as is used for dyeing with madder, is also used in dyeing these colours. Cotton simply oiled, and before mordanted with alum and galls, also combines readily with these colouring matters; but as the colour of the prepared cotton is generally rather yellow, it interferes sometimes with the beauty of the result. Cotton is sometimes coated with albumen, which is coagulated by the action of steam and the albumen which covers the cotton dyed in the usual manner. I may mention that violine, rosine, fuchsine, and also the chinoline colours combine with unmordanted vegetable fibres, as well as aniline purple. Picric and rosolic acids are not applicable for dyeing cotton.

Printing Calico with Coal-tar Colours.—The process generally employed for printing with these colouring matters is simply to mix the colouring matters with albumen or lacterine, print the mixture on the fibre, and then to coagulate the albumen or lacterine by the agency of steam. I and Mr. Gray, of the Dalmonach Print Works, discovered the first proeess of applying these substances to fabrics in a different manner to the above. It consisted in forming a basic carbonate of an oxide of lead on those parts of the cloth which were to be coloured, and then working the cloth thus prepared in a hot lather containing the colouring matter. Where the cloth was mordanted with the lead compound colouring matter was absorbed; but when unmordanted it was left white, because pure cotton is not dyed with these colouring matters in the presence of soap. This process was intended for the application of aniline purple, for at the period of this discovery the other coal-tar colours were unknown. Colours dyed by this process were very pure, but it had many disadvantages, which have caused it to be disused. Lately the process previously described for dyeing colours upon cotton prepared with tannin has been applied to calico printing. It consists in printing tannin upon the fabric previously prepared with stannate of sodium, and then dyeing it in a hot dilute acid solution of the colouring matter. By this means the parts of the fabric which are covered with tannin are dyed a deep colour, but the other parts are only slightly coloured. These are cleared by means of well known proeesses. This method of applying these colouring matters is also modified by printing a compound of the colouring matter required and tannin on the prepared cloth, instead of tannin only, and then steaming the goods.

Method of Applying Aniline Green to Fabrics.—This process is interesting as being the first example of the production of coal-tar colours on the fabric itself. It was proposed by Professor Calvert. His process is very simple. The design is to be printed on the cloth with a thickened solution of chlorate of potassium, dried, passed through a solution of an aniline salt, again dried, and allowed to hang in a moist atmosphere. In the course of two or three days the colour will be fully developed. The colour thus produced may be changed into a dark blue by the agency of soap or

an alkaline liquid. This process is very inexpensive, the amount of aniline required being very small.

Application of Nitroso-naphthaline.—If cloth is printed with a thickened solution of a salt of naphthalamine, dried, and then passed through a solution of nitrite of potassium, nitroso-naphthaline will rapidly make its appearance as a reddish orange colour; but unfortunately, the colour thus obtained will not resist the action of soap well.

Of the numerous colouring matters of which I have briefly spoken, there are only four that are at present employed by the dyer and printer, namely, aniline purple, fuchsine, picric acid, and azuline; but I think it probable that others of them will soon be introduced, such as the bleu de Paris; and nitrophenylene-diamine might be used for silk dyeing, as its colour is good, and it stands the action of light well. Unfortunately, the chinoline colours, though very beautiful, are most fugitive. There has been an endeavour to introduce the chinoline blue of late, but although a considerable quantity of silk was dyed with it at first, it is now scarcely used, because when exposed to the sun for two or three hours the dyed silk becomes bleached. Aniline purple resists the light best. Fuchsine and alpha aniline purple soon fade, especially when on cotton. Azuline and bleu de Paris are not easily acted upon by light when on silk.

When the colouring matters of coal-tar were first introduced, there was a great fear that the workmen engaged in their manufacture, would suffer in health. All I can say is, that during the few years I have had to do with this branch of manufacture, there has not been a single case of illness among the workmen that has been produced by any operations carried on for the production of aniline purple.

ON THE THEORY OF THREE PRIMARY COLOURS.

BY PROFESSOR J. CLERK MAXWELL.

(*Delivered at the Royal Institution, Friday, May 17th*, 1861.)

The speaker commenced by showing that our power of vision depends entirely on our being able to distinguish the intensity and quality of colours. The forms of visible objects are indicated to us only by differences in colour or brightness between them and surrounding objects. To classify and arrange these colours, to ascertain the physical conditions on which the differences of coloured rays depend, and to trace, as far as we are able, the physiological process by which these different rays excite in us various sensations of colour, we must avail ourselves of the united experience of painters, opticians, and physiologists. The speaker then proceeded to state the results obtained by these three classes of inquirers, to explain their apparent inconsistency by means of Young's Theory of Primary Colours, and to describe the tests to which he had subjected that theory.

Painters have studied the relations of colours, in order to imitate them by means of pigments. As there are only a limited number of coloured substances adapted for painting, while the number of tints in nature is infinite, painters are obliged to produce the tints they require by mixing their pigments in proper proportions. This leads them to regard these tints as actually compounded of other colours, corresponding to the pure pigments in the mixture. It is found, that by using three pigments only, we can produce all colours lying within certain limits of intensity and purity. For instance, if we take carmine (red), chrome yellow, and ultramarine (blue), we get by mixing the carmine and the chrome, all varieties of orange, passing through scarlet to crimson on the one side, and to yellow on the other; by mixing chrome and ultramarine we get all hues of green; and by mixing ultramarine with carmine we get all hues of purple, from violet to mauve and crimson. Now these are all the strong colours that we ever see or can imagine: all others are like these, only less pure in tint. Our three colours can be mixed so as to form a neutral grey; and if this grey be mixed with any of the hues produced by mixing two colours only, all the tints of that hue will be exhibited, from the pure colour to neutral grey. If we could assume that the colour of a mixture of different kinds of paint is a true mixture of the colours of the pigments, and in the same proportion, then an analysis of

colour might be made with the same ease as a chemical analysis of a mixture of substances.

The colour of a mixture of pigments, however, is often very different from a true mixture of the colours of the pure pigments. It is found to depend on the size of the particles, a finely ground pigment producing more effect than one coarsely ground. It has also been shown by Professor Helmholtz, that when light falls on a mixture of pigments, part of it is acted on by one pigment only, and part of it by another; while a third portion is acted on by both pigments in succession before it is sent back to the eye. The two parts reflected directly from the pure pigments enter the eye together, and form a true mixture of colours; but the third portion, which has suffered absorption from both pigments, is often so considerable as to give its own character to the resulting tint. This is the explanation of the green tint produced by mixing most blue and yellow pigments.

In studying the mixture of colours, we must avoid these sources of error, either by mixing the rays of light themselves, or by combining the impressions of colours within the eye by the rotation of coloured papers on a disc.

The speaker then stated what the opticians had discovered about colour. White light, according to Newton, consists of a great number of different kinds of coloured light which can be separated by a prism. Newton divided these into seven classes, but we now recognize many thousand distinct kinds of light in the spectrum, none of which can be shown to be a compound of more elementary rays. If we accept the theory that light is an undulation, then, as there are undulations of every different period from the one end of the spectrum to the other, there are an *infinite* number of possible kinds of light, no one of which can be regarded as compounded of any others.

Physical optics does not lead us to any theory of three primary colours, but leaves us in possession of an infinite number of pure rays with an infinitely more infinite number of compound beams of light, each containing any proportions of any number of the pure rays.

These beams of light, passing through the transparent parts of the eye, fall on a sensitive membrane, and we become aware of various colours. We know that the colour we see depends on the nature of the light; but the opticians say there are an infinite number of kinds of light; while the painters, and all who pay attention to what they see, tell us that they can account for all actual colours by supposing them mixtures of three primary colours.

The speaker then next drew attention to the physiological difficulties in accounting for the perception of colour. Some have supposed that the different kinds of light are distinguished by the time of their vibration. There are about 447 billions of vibrations of red light in a second; and 577 billions of vibrations of green light in the same time. It is certainly not by any mental process of which we are conscious that we distinguish between these infinitesimal portions of time, and it is difficult to conceive any mechanism by which the vibrations could be counted so that we should become conscious of the results, especially when many rays of different periods of vibration act on the same part of the eye at once.

Besides, all the evidence we have on the nature of nervous action goes to prove that whatever be the nature of the agent which excites a nerve, the sensation will differ only in being more or less acute. By acting on a nerve in various ways, we may produce the faintest sensation or the most violent pain; but if the intensity of the sensation is the same, its quality must be the same.

Now, we may perceive by our eyes a faint red light which may be made stronger and stronger till our eyes are dazzled. We may then perform the same experiment with a green light or a blue light. We shall thus see that our sensation of colour may differ in other ways, besides in being stronger or fainter. The sensation of colour, therefore, cannot be due to one nerve only.

The speaker then proceeded to state the theory of Dr. Thomas Young, as the only theory which completely reconciles these difficulties in accounting for the perception of colour.

Young supposes that the eye is provided with three distinct sets of nervous fibres, each set extending over the whole sensitive surface of the eye. Each of these three systems of nerves, when excited, gives us a different sensation. One of them, which gives us the sensation we call red, is excited most by the red rays, but also by the

orange and yellow, and slightly by the violet; another is acted on by the green rays, but also by the orange and yellow and part of the blue; while the third is acted on by the blue and violet rays.

If we could excite one of these sets of nerves without acting on the others, we should have the pure sensation corresponding to that set of nerves. This would be truly a primary colour, whether the nerve were excited by pure or by compound light, or even by the action of pressure or disease.

If such experiments could be made, we should be able to see the primary colours separately, and to describe their appearance by reference to the scale of colours in the spectrum.

But we have no direct consciousness of the contrivances of our own bodies, and we never feel any sensation which is not infinitely complex, so that we can never know directly how many sensations are combined when we see a colour. Still less can we isolate one or more sensations by artificial means, so that in general when a ray enters the eye, though it should be one of the pure rays of the spectrum, it may excite more than one of the three sets of nerves, and thus produce a compound sensation.

The terms simple and compound, therefore, as applied to colour-sensation, have by no means the same meaning as they have when applied to a ray of light.

The speaker then stated some of the consequences of Young's theory, and described the tests to which he had subjected it:—

1st. There are three primary colours.

2nd. Every colour is either a primary colour, or a mixture of primary colours.

3rd. Four colours may always be arranged in one of two ways. Either one of them is a mixture of the other three, or a mixture of two of them can be found, identical with a mixture of the other two.

4th. These results may be stated in the form of colour-equations, giving the numerical value of the amount of each colour entering into any mixture. By means of the colour top,* such equations can be obtained for coloured papers, and they may be obtained with a degree of accuracy showing that the colour-judgment of the eye may be rendered very perfect.

The speaker had tested in this way more than 100 different pigments and mixtures, and had found the results agree with the theory of three primaries in every case. He had also examined all the colours of the spectrum with the same result.

The experiments with pigments do not indicate what colours are to be considered as primary; but experiments on the prismatic spectrum show that all the colours of the spectrum, and therefore all the colours in nature, are equivalent to mixtures of three colours of the spectrum itself, namely, red, green (near the line E), and blue (near the line G). Yellow was found to be a mixture of red and green.

The speaker, assuming red, green, and blue as primary colours, then exhibited them on a screen by means of three magic lanterns, before which were placed glass troughs containing respectively sulphocyanide of iron, chloride of copper, and ammoniated copper.

A triangle was thus illuminated, so that the pure colours appeared at its angles, while the rest of the triangle contained the various mixtures of the colours as in Young's triangle of colour.

The graduated intensity of the primary colours in different parts of the spectrum was exhibited by three coloured images, which, when superposed on the screen, gave an artificial representation of the spectrum.

Three photographs of a coloured ribbon taken through the three coloured solutions respectively, were introduced into the camera, giving images representing the red, the green, and the blue parts separately, as they would be seen by each of Young's three sets of nerves separately. When these were superposed, a coloured image was seen, which, if the red and green images had been as fully photographed as the blue, would have been a truly-coloured image of the ribbon. By finding photographic materials more sensitive to the less refrangible rays, the representation of the colours of objects might be greatly improved.

The speaker then proceeded to exhibit mixtures of the colours of the pure spectrum.

* Described in the *Trans. of the Royal Society of Edinburgh*, vol. xxi., and in the *Phil. Mag.*

Light from the electric lamp was passed through a narrow slit, a lens and a prism, so as to throw a pure spectrum on a screen containing three movable slits, through which three distinct portions of the spectrum were suffered to pass. These portions were concentrated by a lens on a screen at a distance, forming a large, uniformly coloured image of the prism.

When the whole spectrum was allowed to pass, this image was white, as in Newton's experiment of combining the rays of the spectrum. When portions of the spectrum were allowed to pass through the movable slits, the image was uniformly illuminated with a mixture of the corresponding colours. In order to see these colours separately, another lens was placed between the movable slits and the screen. A magnified image of the slits was thus thrown on the screen, each slit showing, by its colour and its breadth, the quality and quantity of the colour which it suffered to pass. Several colours were thus exhibited, first separately, and then in combination. Red and blue, for instance, produced purple; red and green produced yellow; blue and yellow produced a pale pink; red, blue, and green produced white; and red and a bluish green near the line F produced a colour which appears very different to different eyes.

The speaker concluded by stating the peculiarities of colour-blind vision, and by showing that the investigation into the theory of colour is truly a physiological inquiry, and that it requires the observations and testimony of persons of every kind in order to discover and explain the various peculiarities of vision.

OBSERVATIONS ON THE ETUA-TREE (*KIGLIA AFRICANA*).

The tree called by the Fantees "Etua" is found growing in several districts of the Gold Coast. It attains a height of eighteen feet or more. The fruit, which is, in its transverse section, of an oblate shape, hangs from the tree by a rounded cord-like stem, sixteen and a half inches long. The length of the fruit is sixteen and a half inches; circumference, in the centre eleven inches, and at the upper and lower ends ten and a half inches; while the diameter is three inches and three-fourths. A tough greenish-brown rind, with dark spots, encloses the pulp, which closely adheres to the cortex. A vertical section shows that the closely-grained nearly dried fleshy fruit is of a reddish-brown colour, the seeds being imbedded in a fibrous and tenacious substance. In taste and flavour the fruit is strongly, but not unpleasantly, astringent; the rind less so; but the bark of the tree is strongly astringent; and I feel satisfied that the bark of the Etua-tree will be found a medicine of great value in the treatment of diarrhœa and dysentery. The negroes esteem it as a sovereign cure for dysentery, and have done so for countless ages. On the Gold Coast the fruit is fetish, and is employed by the wily fetish men and women as a charm. When it is so used, the fresh fruit is painted in alternate stripes of red, white, and black. The colours are composed of ochre, chalk, and charcoal. Thus prepared, the fruit is transfixed to the earth, either in the pathways, house, or about the house of the party who consults the fetish man or woman, as may be directed. Sometimes the fruit is painted entirely black, and then dotted all over with red and white spots, when it is used in a similar manner. The ceremony is an invocation to the fetish to discover the remedy which is suitable to cure the disease of the person seeking advice from the fetish man or woman.—*Remarks on the Topography and Diseases of the Gold Coast. Read before the Epidemiological Society, by R. Clarke, Esq., Colonial Surgeon, Gold Coast.*

ON THE MODE OF DISSECTING LEAVES.

Several correspondents having applied to us for information as to the best mode of dissecting leaves, &c., we subjoin the following particulars, which a correspondent has kindly forwarded to us:—Steep the leaves, seed-vessels, or other parts of the plant, which are required to be dissected, in rain water; leave them exposed to its influence until the whole of the soft or pulpy matters are decomposed. The period required for this operation varies much in different leaves, &c., according to their texture; thus, some require but a few weeks, others as many months. When the pulpy parts are completely decomposed, the next operation consists in their removal

from the fibro-vascular network with which they were originally connected. This requires much care and patience. There are two ways of accomplishing it: one, which consists in carefully exposing them to a stream of fresh water, using at the same time a brush; and the other by simply placing them in fresh water, and removing with care the decomposed portion, in like manner, with a brush. Some difficulty will be found at first in doing this without, at the same time, breaking the fibro-vascular network; but a little practice will soon render it easy of accomplishment. The adoption successively of simply fresh water, and a stream of the same, applied by means of a syringe, will be frequently found desirable. The pulpy portions having been removed, and the fibro-vascular network obtained, the latter must be then bleached. For this purpose, prepare a weak solution of chloride of lime, by adding about an ounce of a strong solution of that substance to a quart of distilled water; then soak the skeletons in this solution for some hours; generally, three or four will suffice, but when they are very thick a longer period will be necessary. After this operation has been performed, wash the skeletons thoroughly in pure water, and, lastly, dry them by freely exposing them to light and air.

LICENCE FOR THE SALE OF METHYLATED SPIRIT.

The Commissioners of Inland Revenue, in their Report to the Government, say:

"The use of this spirit continues to extend, more particularly in dyeing with the new colours at present so generally adopted. In 1860, 460,820 gallons of spirits were methylated; and in 1861, 585,472 gallons.

"We consider that we have now sufficient experience to warrant us in concluding that there is no danger of the preparation being converted into a beverage, and that we may safely remove the restriction which it was at first thought necessary to impose upon its sale and use.

"We have consequently recommended to your Lordships the introduction of the provision now under the consideration of Parliament, that any person paying a licence of £2 2*s.* may retail methylated spirits in quantities not exceeding one gallon at a time without any condition as to the purpose to which the spirit is to be applied."

DISTILLATION OF BEETROOT SPIRIT IN THIS COUNTRY.

Only three of the experimental root distilleries have worked in the recent season. There have been distilled at them 812½ tons of roots, from which have been produced 10,401 gallons of proof spirits, giving an average of 12½ gallons per ton.

The smallness of the quantity distilled is said to be owing to the severe frost of last winter having destroyed or injured a large portion of the roots.

Duty has been paid on 4821 gallons; 1481 gallons have been methylated; 2249 gallons have been removed to other warehouses; and there remain in the distillers' own warehouses 10,869 gallons of old and new spirits.

The quantity of roots distilled weekly still falls far short of that which the apparatus was said to be capable of distilling, and the produce per ton continues below the estimate.

One of the three gentlemen who continue the experiment intends to adopt "Champonnois'" system next season in lieu of "Leplay's."—*Report of Commissioners of Inland Revenue.*

CHICORY, THE QUANTITY PRODUCED, AND THE DUTY CHARGED ON IT.

The duty on home-grown chicory imposed in the last Session was 3*s.* per cwt. up to the 31st of March, 1861, and afterwards 5*s.* 6*d.*

By an Act of the present Session a duty of 8*s.* 6*d.* is to be charged until the 31st of March, 1862, and after that date it is to be raised to 11*s.*; the Customs duty being 12*s.* per cwt.

The quantity brought to charge was 7819 cwt., the duty on which amounted to £1172 17*s.* 9*d.*

The unfavourable nature of the season may account for this trifling produce in the last year ; but the addition to the rate of duty in the present and future years will probably have the effect of very materially reducing the consumption of chicory, thus superseding any efforts on our part (hitherto not very effectual) to check the clandestine substitution of it for coffee.—*Report of Commissioners of Inland Revenue.*

HABITS OF THE CUTTLE-FISH.

Those who are familiar with the poulpes and cuttles of our coasts will readily allow that there is something more than usually repulsive in their appearance. Their flabby, corpse-like fleshiness, now lax and soft, now plumping up, their changes of colour, the livid hue that comes and goes so strangely, the long lithe arms with their cold adhesive powers, their uncouth agility, their cunning adroitness and intelligence, and especially the look of their ghastly green eyes, make them decidedly "no canny." It does not need that they should be sufficiently colossal in dimensions to throw their arms over a ship's hull and drag her under water, as Oriental tales pretend, and as old-fashioned naturalists believed, to induce us to give to them a wide berth. It would not be pleasant to be entwined in the embrace of those arms; and we can sympathize with Mr. Beale, who has described his feelings during an encounter which he had with a beastie of this sort, while engaged in searching for shells among the rocks of the Bonin Islands. He was much astonished at seeing at his feet a most extraordinary-looking animal, crawling towards the surf, which it had only just left. It was creeping on its eight legs, which, from their soft and flexible nature, bent considerably under the weight of its body, so that it was lifted by the efforts of its tentacula only a small distance from the rocks. It appeared much alarmed at seeing him, and made every effort to escape. Mr. Beale endeavoured to stop it by pressing on one of its legs with his foot; but although he used considerable force for that purpose, its strength was so great that it several times liberated its member, in spite of all the efforts he could employ on the wet and slippery rocks. He then laid hold of one of the tentacles with his hand, and held it firmly, so that it appeared as if the limb would be torn asunder by the united efforts of himself and the creature. He then gave it a powerful jerk, wishing to disentangle it from the rocks to which it clung so forcibly by its suckers. This effort it effectually resisted ; but, the moment after, the apparently enraged animal lifted its head, with its large projecting eyes, and, loosing its hold of the rocks, suddenly sprang upon Mr. Beale's arm (which he had previously bared to the shoulder for the purpose of thrusting it into holes in the rocks after shells), and clung to it by means of its suckers with great power, endeavouring to get its beak, which could now be seen between the roots of its arms, in a position to bite. A sensation of horror pervaded his whole frame, when he found that this monstrous animal had fixed itself so firmly on his arm. He describes its cold, slimy grasp as extremely sickening; and he loudly called to the captain, who was similarly engaged at some distance, to come and release him of his disgusting assailant. The captain quickly came, and taking him down to the boat, during which time Mr. Beale was employed in keeping the beak of the Octopus away from his hand, soon released him by destroying his tormentor with the boat-knife, when he disengaged it by portions at a time. This Cephalopod measured across its expanded arms about four feet, while its body was not bigger than a man's fist.—*Gosse's Romance of Natural History.*

AËROLITES.

The fall of one of these bodies is thus described by the Rev. A. H. Denham, of Chorley Rectory, in a letter to the *Times*, Aug. 2nd:—

"I was this day a witness of the fall of an aërolite of, I believe, unprecedented size. As I was driving my wife and children in the vicinity of my house, a rushing sound, gradually increasing in intensity, made itself heard, until at last, with a roar and a scream which still seem to ring in my ears, a flaming mass plunged itself into

the road at the distance of a few yards from my pony's head. My wife and two children were naturally much alarmed, so I directed some haymakers who were at work in an adjoining field to dig for it, while I drove to a friend's house close by. The pony broke out into a profuse perspiration, trembled all over, and showed every sign of the greatest terror. On my return to the spot, after an absence of about twenty minutes, I found that the labourers had succeeded in disinterring what proved a most magnificent aërolite, of such a size and weight as I do not believe to be on record. Its shape is an irregular ellipse, the major axis being $11\frac{3}{4}$ inches, the minor axis $7\frac{5}{8}$ inches; the weight is $83\frac{1}{2}$ lbs. The men who dug it up informed me that it had buried itself nearly six feet in the ground, and was red-hot when they reached it. Indeed, when I returned it was too hot to be touched with impunity by the naked hand. While cooling, the crystals assumed, while constantly changing, the most beautiful prismatic hues. Its specific gravity I have satisfactorily ascertained to be greater than that of iron, but from the imperfect means of testing at my command I am unable to determine the exact ratio. At the moment of its fall the sky was perfectly cloudless. A strong smell of sulphur was diffused immediately after the descent, and I have found several crystals of that element in the cavities on the upper surface, which have escaped abrasion from the soil. Perhaps some of your numerous scientific correspondents will be able to state whether I am right in my opinion as to its being the largest on record, in which case I will present it to whatever museum may be deemed the most appropriate; otherwise, I shall deposit it in the library of the Mechanics' Institute at Lancaster."

The following particulars on the same subject are given by another correspondent of the *Times*:—

"Chladni, a German philosopher, and the first man of science who directed attention to the subject, compiled, in 1794, a catalogue of all recorded instances from the earliest times, from which it appears that Plutarch, in the *Life of Lysander*, describes a stone that fell in the Hellespont, about 405 B.C., which stone was afterwards mentioned by Pliny, who says that it was to be seen in his time, 500 years afterwards, and that it was 'as large as a waggon.' One of the cases of more modern and reliable date is that of a stone which fell at Ensisheim, in Alsace, in 1492. The Emperor Maximilian, being there at the time, ordered an account of the event to be drawn up; it weighed 270 lbs. During the French Revolution it was carried off to Colmar, and many pieces were broken from it. One of the fragments still exists in the Museum of the Jardin des Plantes, near Paris.

"An immense mass of malleable iron of meteoric origin was seen in 1794 by Pallas, in Siberia, on a mountain of slate; its weight was about 1400 lbs. Another vast mass was found in South America, and is described in a memoir in the Spanish language, printed in the *Philosophical Transactions* for 1788, by Don Rubin de Celis. Specimens were sent by him to the Royal Society, and are now in the collection of the British Museum.

"Barrow mentions a mass of meteoric iron at the Cape which weighed 177 lbs.; another mass found in Brazil, about fifty leagues from Bahia, was estimated at the enormous weight of 14,000 lbs. Many other instances of large masses of these bodies have been recorded, but before the fact mentioned by Mr. Denham there existed one instance only of a ponderous mass of iron having been actually seen to fall from the atmosphere. That was at Agram, in Croatia, in 1751. On the 26th of May, about six o'clock in the evening, the sky being quite clear, there was seen a ball of fire which shot along with a hollow noise from west to east, and after a loud explosion, accompanied by much smoke, two masses of iron fell from it, in the form of chains welded together.

"The origin of this remarkable class of natural phenomena is involved in great obscurity; but the theory most consistent with known facts and the laws of nature seems to be that which was proposed by Chladni, and indorsed in 1817 by Sir H. Davy—viz. that the meteors are bodies moving in space, either accumulations of matter or fragments separated from a larger mass of a similar nature. Dr. Halley calculated the height of a meteor at ninety miles. It is supposed that these erratic bodies move with immense velocity, and that they become ignited when they pass through the upper region of the atmosphere."

CORRESPONDENCE RELATING TO THE PROGRESS OF THE SOCIETY.

TO THE EDITORS OF THE PHARMACEUTICAL JOURNAL.

GENTLEMEN,—As there has been a *gentle "legal"* criticism upon my letter in the July number of the Journal, I beg again to offer a few remarks upon it and the subject generally.

It may be that "the examination test applies to skill only," but your "legal" correspondent is silent upon the point from whence this "skill" is derived.

Certainly it is a product of hard work, derived from that mine which gives up only to the digger, and must therefore consist of something more than "*mere skill.*"

Experience does not always depend upon age, for (borrowing the language of a modern writer) "there is a doctrine which youth deems a truth and age a paradox; that in science the young men are the practical seniors, inasmuch as they are schooled in the latest experiences science has gathered up, while their seniors are cramped up by the dogmas they were schooled to believe when the world was some decades the younger."

And this leaves room for the truth that experience depends upon the use each individual makes of the *facts* brought before him.

That the Society is progressing in education and scientific attainments I have not been disposed to deny, but that the proposition (as it stands) to admit new Members is progress I do deny; that is not progression, but a self-evident sign of internal weakness and retrogression. It is all very pretty to tell us "that those who would be admitted by the new rule are the seniors in various long-established concerns," and "that it is more advantageous to belong to a large and powerful body composed of examined juniors and unexamined seniors." Be it remembered that the Society was first established by unexamined seniors, and under their auspices "*we*," the *examined* juniors, became associated by study and hard work, relying upon the good faith of those who were the leaders, that none others would be admitted on any other terms than examination.

That "certain learned Societies" imposed no restrictions or disabilities on their practitioners is true; but it is also true that, when they were established, and their Act of Parliament was obtained, *no* individual was admitted without examination, and I am much inclined to think that your "correspondent" would not be so readily disposed to admit non-professional "outsiders," without examination, into the same privileges which he himself enjoys by examination; such a procedure would, methinks, be very illegal and unprofessional.

As an influential body we now stand out before the public recognized and accredited; the early Members were desirous that all should participate in our privileges and "locus standi," many refused the offer, and, after two successive opportunities, turned to us the "cold shoulder," and left us to our fate. They made *themselves* "outsiders;" they must remain outsiders still; for there is not the smallest reason why we should sink down, in professional and public estimation, by doing an unjust act to let them in.

When we get a compulsory Act there will then be time enough to make provision for these six hundred gentlemen whom it is said are desirous of admission.

Liverpool is a large place, and may be taken as a fair specimen of what we may expect from other large towns, for Mr. Edwards has told us that "it is estimated at from three to five;" therefore we may conclude that a very small per-centage would join us out of this vaunted six hundred.

Be that as it may—it is not a bit the more just to admit three, five, or six hundred than it would be to admit a nominal five. We have borne the heat and burden of the day by ourselves, let us then still stand alone, and prove that we are able by ourselves to support ourselves.

I am sorry to find that one of your Liverpool correspondents should have adverted to the acts of our late lamented President, Jacob Bell, in the manner he has done, for although he speaks of him as one of "respected memory," he does not hesitate to lay a grievous wrong to his charge, in the shape of statements which the living

know but little of, and the dead cannot answer. It is not well, nay more, it is not right, to allude to matters which he could have refuted in his lifetime, and the public would have had an opportunity of judging of the merits on both sides, which, since his demise, they have not the power to do. But for that respected name *no* Pharmaceutical Society had lived; he laid the foundation, and raised its superstructure high, not by a dogmatic will, but in concert with others; he laid it upon a liberal basis; he worked with a liberal hand and a generous heart, and desired that all might be participators with him in this march of progress. But, forsooth, because some have kept aloof and refused to join the ranks, it is put down to the "one error of his policy."

We have yet to learn that it was an error of policy. Could there have been a broader and more liberal basis than was originally adopted? Was not every man in business who made any pretensions to the name of Chemist and Druggist, and assistants too, invited to join on equal and liberal terms? It was an offer made which all could have accepted; but, because some reject it, and in the very face of all that is liberal and generous, it is put down to an error of policy, and this "*assumed*" error is to be corrected by a flagrant act of injustice.

Whatever faults our departed friend may have had, this was not one; and those of us who admired the man in his lifetime are not ashamed to pay a passing tribute of praise to his memory, and to acknowledge our obligation for his devoted and untiring energies in endeavouring to promote the advancement of pharmaceutical and chemical science.

Now to my propositions.

What the exact "pecuniary" wants of the Society now are I know not, for as far as I remember we have not had a direct official statement; however, an increase of funds appears necessary.

In looking over the balance sheet I perceive an item for Journals, postage, &c., to the amount of £599 10*s.* 3*d.* Upon this I have made a rough calculation, and find that there is an annual cost to the Society for the postage of Journals of somewhere about £160. My first proposition then is:—Do away with this by calling upon each Member and Associate, &c., to pay his own postage; this would give an immediate increase of £160 per annum raised in pence, and I have no doubt there are other small items which might be cut down, and thus increase the amount to £200.

Then I would propose that the present admission fee be somewhat reduced, and the usual *annual* subscription of 10*s.* 6*d.* and 21*s.* be added thereto. If this be objected to, make a calculation of what is requisite to maintain the Society properly, and then place an *increased* amount on the examination fees already existing, receiving the *whole* amount when the examinations are passed, and "*not*" allow *any part* to remain over until the Member becomes established in business.

If there is a *present* emergency for funds, I would suggest that a *call* be made upon the Members sufficient to raise up a sum to meet it, and I doubt not but it would be liberally responded to, and we should give the public, and Parliament too, a very practical proof that we are able to maintain ourselves.

I am, Gentlemen, your respectfully,

Bristol, 17*th August*, 1861. G. G. Hornsby.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—If there be any present or prospective difficulty with regard to the funds of the Pharmaceutical Society, I certainly think that difficulty should be met in a more satisfactory way than by the *partial* admission of the Druggists at large into the Society. The present time might no doubt be a good one to revise the Bye-laws, but that revision ought to be done in such a way as to make the laws, when altered, available for a great many years. One great objection to the proposed alteration is, that all those invited to join the Society have had one (and *most* of them more than one) chance of becoming Members on very easy terms, and the natural question arises, Ought they, in justice to those who *did* enter at the passing of the Act or on the foundation of the Society, to have still another chance of being placed (as far as external position goes) on a level with them? If this question applies to those Druggists who have been admitted *without* examination, with how

much more weight does it apply to those Chemists (both in and out of business) who have studied hard and gained what they believe to be an honourable position amongst their fellows. This reminds me of the proposition of two of your correspondents last month, that another degree should be created, viz. that of Fellow of the Pharmaceutical Society; but I would restrict the application of this term even amongst those who are *now* Members, and only those who have passed the examinations, or shall in future pass them, should have it conferred upon them. In conclusion, I would remark that I believe a very material alteration could be made in the financial state of the Society, by changing the present mode of payments. First, I would *cease* to create *Life* Memberships. Secondly, all Members admitted *in future* should pay in the same manner as the older Members admitted before 1853. Thirdly, I think the Members should not have the Journal gratis on paying an annual subscription of one or two guineas, or being Life Members, and under the latter category I include all who have entered under the present Bye-laws. If Members wished to have the Journal, they should pay just as much more (in even money) as the net cost of the Journal to the Society; thus that heavy item of £600 would be annually saved. I think this last proposition deserving the very serious consideration of the Council.

I am, yours respectfully,

Wakefield, August 6, 1861. T. W. Gissing.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Esteemed Friend,—The Pharmaceutical Society was established to raise the status of Chemists and Druggists, and to enable them to take their position among the educated scientific bodies of the country. Acknowledging the mental power required to the adequate discharge of the onerous position of dispensing medicines, in which an error would risk human life, it aimed at providing such legislative enactments as should secure a legal protection to its Members, such as is enjoyed by other corporate branches of the medical profession, so that they might fairly expect a remuneration equal to their position and education, which proportionately to other trades they do not get. The Chemist works hard, late and early, and is badly paid.

The Pharmaceutical Society have already done much; they have been granted the exclusive use of the term Pharmaceutical, which is a precedent and prestige clearly to be followed by compulsory law, and acknowledges the Society as the representative of the *entire qualified trade.*

When this course seems inevitable—when young men have been prompted to expensive courses of study, and masters have paid their fees—some mischief-makers concoct a counter society to rob *the Society* of the fruit of its labours, to prevent legislative enactments, and to destroy the protection with which it has been seeking to guard its Members. I stigmatized such efforts in the *Chemist and Druggist* as mean and unjust, and I still hold them to be so.

This being the case, it appears to me that to open the doors again to the trade would be weak and useless. The correct line appears to me to be—get *compulsory legislation*; if you do that, all outsiders must then be admitted on some terms. You can have distinctive names, if you like, as Licentiate and Fellow in addition to present ones; but none should be allowed *to dispense* or *sell poisons* without the Society's sanction.

65, *Old Town Street, Plymouth,* F. P. Balkwill, M.P.S.
8*mo* 8*th*, '61.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

My dear Sir,—I would wish to lay before you a few opinions on the topic which, among Chemists (and Druggists), appears to be the leading one of the day.

I am not a Member, Associate, or Registered Apprentice, but my father being a "foundation Member," and having served with him in the business for some years past, I think I am entitled to a hearing.

Imprimis. Undoubtedly there are many *pros et cons* on the subject, bearing a heavy weight on each side. I will endeavour to point out, as well as my limited ability permits, the most palpable parts of both. The Pharmaceutical Society was, I believe, incorporated by Royal Charter in 1841 or 42, having now the experience of

the fifth of a century. Numbers have profited by the examinations, and have proved to be worthy of the prefix "M.P.S." Query, have not many young men been kept back, as it were, and daunted by the laboratory, long faces of examiners, fear of incompetency, and last, but not least, pecuniary circumstances ? It cannot be denied but that, to a person of, say, a fair share of intellect, a vast amount of study and experiment and expense is requisite to make him fit for the examination. I would ask, How many are there of Chemists' assistants and 'prentices who, in truth and fact, *cannot*, without injury to health of mind and body, devote the necessary time for such study?

They may have books, but books unread will do them no good; they may have experiment, but experiment unnoted will be of no use. Here, then, I would ask, if the following proposition is practicable?

To divide the two examinations into two grades.—The first to comprise men who can afford time and money for furthering the movements of the Society. The second for those who, by business matters and limited communication with the *higher* branches of Pharmacy (such as Mr. Watson ably remarks "*à la Fownes*," and probably *à la Pereira* and *à la Thomson*), have only acquired such knowledge as fits them for dispensing prescriptions and preparing drugs and chemicals. To the former affix, in accordance with Mr. Houlton's view, F.P.S.; to the latter, M.P.S.

Then, again, if the permission is granted to those who choose to pay £5 5*s.* and the annual subscription to become Members, are there not many "grocers in reality," but vainly assuming the cognomen of "druggists," who would jump at the idea of being able to write M.P.S. (which in that case would be *Malus Puer Sum*) after their names and on their labels, who would be perfect bugbears to the Society at large?

With regard to the opinions of the various Members on the subject, I deem it worthy of consideration by the Council if they can do somewhat as follows:—

Send a copy of the proposed alterations of, or additions to, the laws of the Society to a Member in each town, and let him canvass the other Members, by making them subscribe Aye or No to the clauses.

In conclusion, I would say that Pharmacy is a branch of science that requires long, deep, and careful study, as well as practical experience, before it can in the slightest degree be mastered. Therefore I do not think it justifiable to the hard-working, painstaking Members in permitting those who know comparatively nothing to become Members of this now honourable and arduous Society.

I am, my dear Sir, very obediently yours,

26, *High Street, Exeter, Aug.*, 1861. ALFRED JOHN TRIX.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—I am much relieved from the uneasiness caused me by the proposed alteration of the Bye-laws, by reading the very sensible letters protesting against it in the last two Journals. I thought the former admissions injudicious and mischievous, and believe it has seriously affected the present position of the Society. My own motives for joining on the formation of the Society, were to assist in cultivating and diffusing scientific information amongst the trade generally, of which the majority were, and still are, lamentably in want. When first established it was joined by most men of consideration, talent, and reputation, desirous of advancing their knowledge, respectability, and public estimation, as Pharmaceutical Chemists, and its Members were beginning to be known and recognized by the public as such. By a mistaken opinion the doors were thrown open, and many Members of a very different class and very inferior, or rather having no qualification, were admitted, and the public shown the little worth and low estimation of membership. Should this again be done, what little status or prestige remains to us will be lost, and the Society justly considered a sham and delusion. I am sure the present inquiry will show there are very few qualified or deserving men requiring admission, and that the only dignified and proper course for the Society to adopt is to raise its qualifications and position by honourable and scientific means, not by base and sordid motives, and having these claims on the sympathy, consideration, and support of the public, it may successfully appeal to the Legislature

for any reasonable advantage. With Mr. Judd, of Christchurch, I consider the scheme most objectionable. Its adoption would involve injustice to the present Members, a loss of public confidence in the Society, indefinite postponement of effective legislation, and a hindrance to the Society's future progress.

Chertsey. JOHN P. BOYCE.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—As one of the oldest examined Members of the Pharmaceutical Society, I certainly feel called upon, in common with many of my fellow-Members, to protest against an act that certainly, and in all honesty, must be regarded as unjust towards a large body of young men who, at great inconvenience, expense, trouble, and study, have passed the required examinations, gaining for themselves the somewhat enviable title of Pharmaceutical Chemist.

As originally constituted and framed, it was impossible to exclude uneducated persons, but *tempora mutantur:* there is now a large body of young men coming up whose laudable ambition is not only to use the title (so much coveted by many, who have not the requisite knowledge or perseverance to gain it by their own individual merit), but also to use the addition, "Member by Examination." They are compelled to adopt this in self-defence, in contradistinction to many who certainly are legal Members, but whose education and standing in the world tend rather to depreciate the value and mar the professional character of the Society, whose idea was probably that if they could not raise the Society, the Society could and would raise them.

I am certain there are very few examined members that would refuse to lend to others a helping hand, but we certainly, as a body, must act up to that oft-reiterated proverb, "Be just before you are generous." There cannot be a doubt but that the membership is an advantage in a business point of view; it gives to the public confidence, to the possessor self-confidence, reliance, and self-respect, while it ensures to the medical profession that the holder is either an educated and qualified Pharmaceutist, or that he, from long experience, must be drilled into the requisite amount of knowledge for proper and systematic dispensing; but do away with the examinations, and you shake the confidence of the public, who will naturally sneer at a Society which will make a law to-day and break it on the morrow. The educated man will keep aloof, justly regarding it as no honour to become associated with those whose only or principal recommendation will be that they were happily in business before him. The medical men will hardly be able to discriminate between him whose recommendation is merit and knowledge, or him who, from fortuitous circumstances, and from the leniency of the Council and apathy of the existing Members, is enabled to display the pretty picture, as the diploma is so termed.

I certainly think that it will be regarded as an insult to those who have borne the heat and burden of the day, even seriously to entertain the subject. It is but just that those who treated lightly the Society in its struggles (and ofttimes actively opposed it), now that it has gained respectability, popularity, and, I hope, stability, should be treated with the nonchalance they are entitled to; and I hope the day is very far distant when the membership will thus go begging.

Let every present Member put his shoulders to the wheel, infuse new blood into it by having his apprentices registered and trained up, aiming at attaining the goal of their ambition—the possession of the title of Member of the Pharmaceutical Society—and I have no doubt that we shall see the Society outriding all difficulties, and sailing on in a glorious and prosperous course, aided and propelled by an imperative Act of Parliament. In conclusion, I certainly think that the suggestion of your correspondent relating to the adoption of Fellowship worthy of consideration; it has oft struck me that such would be advantageous, but I wished to see if others adopted a similar view.

I remain, Sir, yours obediently,

5 *and* 6, *Onslow-road, Southampton.* JOHN SMITH.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—Seeing that the Council are desirous of obtaining a pretty general opinion with regard to the proposed change in the Bye-laws, as a Minor Associate I have

penned a few remarks, hoping you will deem them worthy of your notice. With many others, I regard the proposed change as a great injustice to the examined Members, Associates, &c., and neither tending in any way to advance the Society in the estimation of the public, or to promote the cause of progression in Pharmacy. Great apathy undoubtedly exists with regard to pharmaceutical education, the cause of which is evident, for while any unqualified person with a little business tact and ability can write up Chemist and Druggist over his door, you will find comparatively few willing to spend time and money in passing the very proper examination at present required for appending Pharmaceutical to the above, and until some sweeping measure is introduced, such as an Act of Parliament, compelling all persons entering our profession to pass an examination, I fear we shall never obtain a majority of properly qualified Chemists and Druggists in this country. If the proposed change is sanctioned by the Committee, I for one shall feel great reluctance to spend any further time or money in passing my Major Examination, prior to taking up my membership. I am, Sir, respectfully yours,

Guildford, August 5th, 1861. A Minor Associate.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—Amongst the many communications which have at present appeared in the *Pharmaceutical Journal* respecting the proposed alteration of the Bye-laws of the Society, decidedly the greater number are in favour of the change likely to take place. That it would eventually be productive of good, must be certain, not so much for the sake of the remuneration it would afford the Society, as from the strength and importance which are sure to result.

But while there are many who view the proceeding in a very favourable light, there remain some who protest most strenuously against it, and here it may not be improper to suggest that only those Chemists who are well established could be admitted under such favourable circumstances, and by this method of proceeding I feel persuaded that the rising generation of Chemists would be materially benefited.

At the same time it would be a great injustice to those who have been at the expense and trouble of passing the examinations of the Society, to admit men of business who so recently as within the last ten years have concluded their apprenticeship, and I feel certain that the majority of young men who are now anxious to become Members of the Society in the legitimate manner, would endorse my opinion, and throw up all idea of connecting themselves with the Society, if Chemists of such recent establishment should be allowed a privilege for which many have struggled incessantly and arduously. I am, Sir, yours obediently,

An Associate.

Camden Town, August 12th.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—I think, out of justice to those young men who have, at a great expense to themselves and friends, passed the Major Examination, that none should be admitted as Members until they have gone through the same ordeal. The plain fact of my being duly qualified has been the only means by which I have been enabled in many cases to overcome the existing prejudices, and in one or two instances the unjust tyranny of physicians when the purity of my preparations have been called in question. We are too much alarmed at the cry of wolf, instead of standing on our own resources and mutual dependence upon each other. The only plan open for us qualified Pharmaceutists is this—viz. to seek for a diploma from some university or college, who will make degrees dependent upon proficiency, not money.

I remain, yours, &c.

7, *High Street, Southampton,* J. E. Jennings.
Member by Examination.

THE TITLE OF PHARMACEUTICAL CHEMIST.

(Bloomsbury County Court, August 21st, 1861.)

The Pharmaceutical Society v. *Mikisch.*

Mr. Flux stated that the action was brought to recover £5, the amount of a penalty incurred by the defendant in "assuming, using, and exhibiting" the name of Pharmaceutical Chemist, contrary to the provisions of the Pharmacy Act. The title of Pharmaceutical Chemist was a distinction limited by Act of Parliament to registered Pharmaceutical Chemists, and unauthorized persons not unfrequently assumed the use of it. The Council of the Society of course protected the privileges of its Members, and hitherto the threat of proceedings had in every instance induced offenders to discontinue the causes of complaint, and thus it had occurred that no earlier case had been brought before the Court. In the present instance every opportunity had been given to the defendant to settle the case upon the condition of his discontinuing the offence, but he asserted a right to use the title "Pharmaceutical Chemist," and consequently the Council had no alternative but to try the case.

The Registrar of the Court suggested that as the defendant was a foreigner, he should instruct an attorney.

Mr. Flux expressed his willingness to adjourn the case if the defendant wished it.

The Defendant (who spoke English fluently) said that he did not require an attorney.

Mr. Elias Bremridge was called and sworn. He was the Registrar of the Pharmaceutical Society of Great Britain, and was authorized by the Council to sue the defendant in the name of the Society. He had seen the words "Surgeon and Pharmaceutical Chemist" written over the door of the defendant's shop at No. 141, Great Suffolk Street, Borough. He produced the Register of Pharmaceutical Chemists. The defendant's name did not appear on such Register.

The Defendant produced a diploma, entitling him to bear the title of "Pharmacien" in Belgium, and asserted that he was a Surgeon in England, and that consequently he was entitled to use the title Pharmaceutical Chemist.

The learned Judge referred to sect. 11 and 12 of the Pharmacy Act, and expressed his opinion that no persons, unless duly registered, could lawfully use the title of "Pharmaceutical Chemist" within Great Britain, and also that no "Surgeon" could be a Pharmaceutical Chemist. The defendant had clearly incurred the penalty of £5, and judgment must be given for the full amount. He should have reduced the amount if the Act of Parliament had given him power so to do, because the defendant appeared to have acted under a mistaken view of the law, and he suggested that judgment should be waived.

Mr. Flux said that he would take the judgment, as he could refrain from enforcing it if the Council should so instruct him, and the Council would no doubt have regard to the defendant's future course of conduct.

The learned Judge then informed the defendant that he would incur further penalties by continuing the unauthorized use of the title. Judgment was then taken for £5 and costs.

THE PREVENTION OF ACCIDENTAL POISONING.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—I see by your Journal for August, that the above subject came under consideration at one of the meetings of the Pharmaceutical Council, and that "a Committee has been appointed to consider the best arrangements to be adopted for the protection of the public against accidental poisoning."

The Committee invite "*the assistance of Members throughout the country who have suggestions to offer.*" Although not a "Member" of the Society, I venture to offer a few remarks on the subject, for as *one of the public* I am naturally interested in the question, and I hope I am not on that account the less capable of giving an impartial opinion.

You say that "*it will be the object of the Committee, if possible, to propose such practically available means for lessening danger, as shall meet with the assent of all those engaged in the sale of poisons.*" Allow me to remark on that point, that considering the opposition which has been brought to bear on any proposed change in the mode of dispensing poisons, it is not probable that a very unanimous assent would be accorded to the propositions which may emanate from your Committee on that subject. It will be wiser, therefore, not to run the risk of failure by relying on the expectation of any such result. Let the question be decided by the voices of a *majority* of your Members, and the case would not be such a hopeless one. I am not aware what plans are in contemplation, but I would wish to point to one which I believe less likely than any other to meet with opposition. It is, that the *narrow-necked* or "safety bottles" be adopted generally for keeping and sending out liquid poisons in. I cannot imagine that any reasonable objection can be brought forward against the use of such a simple and inexpensive plan. It could only be negatived by those chemists who obstinately set their face against any change of the kind, however useful and needful it may be ; but it is to be hoped that in these days such non-progressionists are few in number, and form a very small proportion of the brotherhood linked together for the purpose of raising the educational *status* of chemists.

It is very desirable that your Council should determine upon carrying out this or some other protective measure, which can be shown to be more likely to secure the public from this particular class of accident, which is becoming more and more prevalent, not only endangering but sacrificing many lives.

In the absence of any movement of the kind by chemists themselves, it is most probable that Government will not allow another session of Parliament to pass by without taking upon itself the duty of enacting a measure by which the employment of some safety method in the dispensing of deadly drugs shall be made compulsory.

You say "*it is obviously the duty, and it is no less the interest, of those engaged in the sale of poisonous substances, to adopt the most efficient means of protecting the public from danger in their use.*" Let that idea animate the Committee, as well as the Members who may enter into a discussion on the subject in your columns, and we shall have no reason to be dissatisfied with the result.

I cannot conclude without offering some apology for so freely stating my views; but as I believe that a new spirit pervades your proceedings, I do not fear that you will take amiss what I have intended for the benefit of your profession, as well as

Richmond, August 3rd. PRO BONO PUBLICO.

CASE OF POISONING BY ACONITE.

THE following details of poisoning by aconite are given by Dr. Lombe Atthill, in the *Dublin Quarterly Journal of Medical Science* for August:—

On Friday, the 4th of May, 1861, I ordered the following liniment for a gentleman who was suffering from a painful affection of the hip-joint:—soap liniment, two ounces; tincture of aconite, three drachms. At the same time I prescribed a mixture, of which he was to take one table-spoonful for a dose. He was a weakly, delicate man, and had for several years been subject to fits of epilepsy. On the following morning, having rubbed in the liniment as directed, he proceeded to take the mixture; but, having placed the two bottles together, instead of doing so, he inadvertently poured out and swallowed a table-spoonful of the liniment, which must have contained 48 minims of the tincture of the Pharmacopœia. This was at 10 minutes to 8 o'clock A.M. He immediately perceived his mistake, and as quickly as possible sent for me; but though no time was lost, I did not reach him till about 20 minutes to 10 o'clock, for he resided in the country. I found him dressed, sitting on a chair in his bedroom, and supporting his head on a table, with a basin before him. He was sickish, having retched frequently, without discharging the contents of the stomach. He had drunk a good deal of warm water, and to this and the soap liniment he had swallowed we may attribute the inclination to vomit.

His appearance did not indicate anything very unusual. He told me that he had been walking up and down the room till within ten minutes of my arrival, when he

was compelled to sit down, feeling himself prostrated and entirely overcome by the effects of the poison. He complained of extreme languor, and a great sense of oppression and weight, with inclination to yawn; but his most distressing symptom was a feeling of dry heat and tightness of the skin over the whole body, accompanied by the sensation of numbness and tingling. This, he stated, commenced in his feet, within a very few minutes of his having swallowed the poison, and spread quickly upwards. There was not at this time any dilatation of the pupils, but they seemed to act sluggishly, nor had he any unpleasant feeling about the throat or mouth. His pulse was very feeble, and faltered rather than intermitted; but, within ten minutes of my arrival, it began to intermit in a most marked manner; and the intermissions were more frequent and prolonged, until the pulse ceased to be felt altogether at the wrist.

The moment I had made a few hurried inquiries, I administered the only emetic at hand, namely, mustard. How much I gave I hardly know, for I shook it into a cup, and mixed it as quickly as possible. Immediately on his taking this, I got him into bed, and placed a hot jar to his feet, which were very cold. Shortly after I administered more mustard, the first dose having failed to act as an emetic. After this he began to retch again, but only brought up mouthfuls of frothy mucus, tinged with the mustard.

For several hours the struggle between life and death went on, during which time the patient—who had been subject to fits of epilepsy—had four convulsive fits, the fourth having lasted twenty minutes. From this time he gradually rallied.

The treatment consisted of, at first, the free exhibition of mustard, then of hot brandy-and-water and strong coffee, given in small quantities every few minutes, though these were rejected as fast as swallowed. After the arrival of Dr. White, who had been summoned to assist in this case, we gave half-drachm doses of the aromatic spirit of ammonia frequently, also brandy-and-water, as before; and, later in the day, when he became drowsy, strong green tea. Externally, mustard sinapisms were applied to the epigastrium, cardiac region, nape of neck, and calves of the legs, in succession. Friction was kept up for hours over the thorax, arms, hands, and legs, both with the hand and flesh-brush. During the two severe fits, when respiration was suspended, artificial respiration was kept up by Sylvester's method for some minutes, and with marked success.

UNLAWFUL ADMINISTRATION OF CANTHARIDES.

Liverpool Criminal Court.

(Before Mr. Baron Martin.)

Henry Wilkins, aged 55, was indicted for having, at Ashton-under-Lyne, on the 25th of April last, unlawfully administered a certain poisonous drug, called cantharides, to Rachael Sutcliffe, with intent thereby to "injure, annoy, and aggrieve" her.

Mr. Kay prosecuted; the prisoner was undefended.

It appeared that the prosecutrix, a woman about 40 years of age, kept a lodging-house at Ashton-under-Lyne. Her husband was away from her, and the prisoner was one of her lodgers. It appeared from the evidence of the prosecutrix that the prisoner had been free in his manner towards her, and on the 25th of April last, when he came home to tea, he put a powder in her teacup, and she saw something floating about in her tea, and skimmed it off. She drank a portion, and then asked him what he had put in her tea? He told her to drink it while it was warm, and it would do her good." She felt ill afterwards, and sick, and went to a doctor, who found her labouring under a poisonous dose of cantharides. The prisoner was afterwards taken into custody, and in his waistcoat-pocket was found a small packet of cantharides, which he said he used as an outward application for rheumatism.

His Lordship said he doubted very much whether this was one of the cases contemplated by the statute, and whether the drug was administered with intent "to aggrieve, injure, or annoy" the prosecutrix. The statute had been passed to meet cases where drugs, out of mischief, as jalap, were administered to annoy persons, to do which was made a misdemeanour. If, however, the jury were of opinion on the facts that the prisoner administered the cantharides with the intent to excite the

sexual passions of the prosecutrix, and on that ground found him guilty, he would reserve a case for the opinion of the Judges in the Court of Criminal Appeal whether the statute contemplated such a case as this or not.

The jury found the prisoner *Guilty* on the ground stated.

His Lordship then directed that the prisoner might be let out on bail, himself in £100 and with two sureties each in £50, to appear and receive judgment at the next assizes, after the case shall have been heard and decided in the Court of Criminal Appeal.

EXPLOSION OF PARAFFIN OIL.

Mr. G. S. Brent, Deputy Coroner for West Middlesex, instituted an inquiry at the Bank of England Tavern, Cambridge Place, Paddington, into the circumstances attending the death of Mrs. Mary Ann Stokes, aged 36 years, late resident of 18, Desborough Place, Harrow Road. It was shown from the evidence of several witnesses that on the 26th of July, deceased, while in the act of trimming a paraffin lamp, accidentally dropped a lighted lucifer-match into the fluid, by which it was ignited, and an explosion followed. The burning fluid set fire to the apartment and to the clothes of the deceased. Her husband, being in the room at the time, in his efforts to extinguish the flames, got very severely burnt. The shrieks of Mr. and Mrs. Stokes alarmed the neighbourhood, and quickly brought assistance, and after some difficulty the fire was subdued, and the two unfortunate sufferers were removed to St. Mary's Hospital, where Mrs. Stokes died on Thursday, August 1st, from the effects of the injuries she had sustained. It was generally admitted by the jury and others that paraffin lamps were very dangerous in consequence of the explosive nature of the spirit used. Verdict—"Death from burns, caused by the accidental bursting of a paraffin lamp."

On Thursday, August 8th, Mr. Stokes died, and an investigation by the Deputy Coroner was commenced on Monday, the 12th, and concluded on Wednesday, the 14th of August.

Mr. G. H. Johnson appeared on behalf of the Paraffin Oil Company, 17, Bucklersbury, City.

Mr. M. B. Stokes was the first witness examined. He deposed that the deceased was his father. On the night of the 26th of July the witness undertook to pour fresh paraffin oil into a paraffin lamp his father had lately purchased. His mother was holding a lighted match in her hand, and she accidentally dropped it into the lamp, which immediately exploded with a hissing noise, shivering the globe and upper part of the lamp into fragments, and scattering the blazing fluid over various parts of the room. It set fire to the window-sash and furniture, which burnt in such an alarming manner that two fire engines shortly afterwards arrived. The flames were, however, soon subdued by the exertions of the deceased and others, but not until deceased and his (witness's) mother had both been frightfully burnt, and a large portion of the window-sash consumed. The injuries his father and mother had sustained rendered it necessary to have them immediately removed to St. Mary's Hospital, where the latter died on Thursday, Aug. 1st, and the former on Thursday, Aug. 8th.

Dr. Odling, analytical chemist, of 6, Prince's Place, Kennington Road, on behalf of the Paraffin Oil Company, produced a sample of what was described as the genuine paraffin oil, and also another sample of oil which it was asserted had been purchased for the deceased at a shop in Margaret Terrace, Paddington Green. The witness showed that the genuine oil would not ignite by the insertion of a lighted match, and could not possibly explode; but the other sample did explode. It was, no doubt, the cause of the explosion that the latter had been used.

After a deliberation the jury asked for an adjournment, which was granted by the Deputy Coroner.

On Wednesday the Deputy Coroner, in re-opening the proceedings, said the adjournment was solely for the purpose of ascertaining if the article which, by a most disastrous and unexpected explosion, had caused not only the death of the deceased but his wife also, on whom an inquest had been previously held, alleged to have been sold for paraffin oil was really paraffin oil, or only a dangerous substitute. He could not do otherwise than look upon this inquiry as an important one to the public, and particularly to the poorer classes, considering the recent very large consumption of paraffin oil. He was willing to give the widest scope possible to the case. The

important question now for the jury to decide was, whether paraffin oil was an article that could or could not be safely used. Dr. Odling, a gentleman experienced in analytical chemistry, had already shown that there was a dangerous article sold for paraffin oil, which could not be used with safety; and now it was simply for him to inquire whether this was really paraffin oil or not; and he should again examine Mr. M. B. Stokes, son of the deceased, for that purpose.

Mr. M. B. Stokes, on being recalled, reiterated his former evidence as to the cause of the accident.

Other witnesses stated that the explosive fluid broke every pane of glass in one window of the room, and spread so rapidly that the sash was completely burnt out, and the ceiling blackened, charred, and cracked.

Miss Stokes deposed to having purchased half a gallon of paraffin oil about two months ago at Mr. Wood's, of Paddington Green.

Dr. Odling then experimented with a part of the explosive oil which had been left untouched in the can, and an ordinary sample of the Paraffin Light Company's oil, —first, by showing that the explosive substance gave off an explosive vapour in the ordinary temperature, whereas the latter oil did not; and secondly, with lighted matches, set the explosive oil in a sheet of flame. The company's oil would only burn like a wick. He denied that the explosive substance was paraffin oil; it seemed a dangerous substitute, and to be a petroleum oil; its gravity was but about 794, but Young's patent paraffin oil was 820, making the oil that exploded to be 26 degrees lower than that of Young's.

Mr. Wood, the retail vendor, was examined at some length. He had been made an agent of the Paraffin Light Company for the sale of their oil since 1859; during that time, however, he was pretty regularly supplied with oil manufactured by another party, from Messrs. Lamb and Palmer, of Old Broad Street, as well as by the company.

In a lengthened cross-examination by Mr. Johnson, witness admitted that he did not believe the oil that exploded to be Young's patent, nor did he believe it to be Lamb and Palmer's. He considered both were excellent articles. He had purchased no oil whatever from the company since the 1st of May last, and had been supplied from that time by Lamb and Palmer, and if the exploded oil had been purchased of him it was probably Lamb and Palmer's, which he called paraffin oil, but which was invoiced mineral oil.

Mr. Horner, as the representative of Lamb and Palmer, said he was prepared to show that their oil and that of Young's were manufactured of the same material, and that they had never sent out oil at such low gravity as 794, but generally from 815 to 825,

Mr. Johnson said the fact was, the Paraffin Light Company were the patentees of the paraffin oil, and no other oil was called by that name until after its introduction about five years ago. It now got into such general use that other people were induced to bring forward other oils and call them paraffin, although, perhaps, they were of a highly dangerous character. The Paraffin Light Company decidedly objected to any other oil but theirs being called paraffin.

The Deputy-Coroner briefly summed up, and

The jury, after a deliberation, returned the following verdict:—

"That, on the 8th of August, Montmorency Durant Stokes did die from the mortal effects of burns and other injuries of divers parts of his body, occasioned by his having become burnt by an explosion of the vapour of a certain substance called paraffin oil, but which was not the paraffin oil sold by the Paraffin Light Company, and that the explosion aforesaid, and the death of the said Montmorency Durant Stokes, were caused accidentally and by misfortune."

MISCELLANEA.

Opening of a Palm-spathe with an Audible Report.—About 11 A.M. on Sunday last, two young men employed in the great palm stove of the Royal Botanic Gardens, Kew, were startled by a report almost loud enough to have proceeded from a pistol. On looking round, it was found that one of the large *Seaforthia elegans*, the palm producing the Moreton Bay canes of commerce, had burst its spathe, and

in doing so forced off the remnant of an old leaf-stalk, about three feet long and more than a foot broad. For a long time Alexander von Humboldt (compare "*Views of Nature*" and "*Cosmos*") stood alone amongst the moderns as an observer of this curious phenomenon, which reminded him of Pindar's Dithyrambic on Spring, and the moment when in the *Argive Nemæa* "the first opening shoot of the date palm announces the coming of balmy spring." It was subsequently confirmed by Schomburgk ("*Travels in British Guiana*," ii., p. 376), but there has been no other confirmation, which renders the observation made at Kew highly acceptable. The sudden bursting with an audible report is probably due to a great accumulation of heat developed by the anthers whilst enclosed inside the spathe. From the familiar manner in which Pindar alludes to this loud bursting, one would be inclined to infer that the phenomenon was a common one with regard to the Date Palm; yet it is strange that we have no modern observations on that plant; at least I could find none when I wrote my "*Popular History of the Palms.*"—*Berthold Seemann in Gardeners' Chronicle.*

The Root of Ginseng.—When, after the capture of Pekin, the French broke into the Imperial Palace, they found among other valuables some specimens of the rare and far-famed root of Ginseng; and Dr. Armand has lately given us some account of this medicinal plant, of which so many wonderful tales have been told. Its real name is Gin-sen or Nin-sen; "gin" or "nin" meaning apple, and "sen" health, power, potency. This root is a remedy so highly esteemed in China, that it is almost valued at its same weight in gold. The plant grows in Tartary, and has, probably, small leaves, as the neck of the root, where it is cut off, when collected, is very narrow. At the neck the root divides into two parts which appear of a whitish yellow colour, a little wrinkled, and semi-transparent, especially at the end, where they divide into small branches. When broken, the root has the same semi-transparent appearance. It is light and without smell, and tastes like liquorice-root, first sweet and afterwards rather bitter. When used, it is cut into very small pieces and boiled in a water-bath. The remainder may be used again, as is the case with tea. The decoction of one drachm to half an ounce is taken every morning before breakfast, for from three to eight days together; and sometimes it is also taken in the evening before going to bed. No change is made in the diet or the general habits of the patient, with the exception that tea is forbidden for at least a month, as by its use the beneficial effect of the Ginseng would be counterbalanced. This would lead to the supposition that the Ginseng restores the digestive functions, which have been weakened by the immoderate use of tea. The Chinese do not believe that the root of Ginseng can prolong life, as it is never taken by old persons, nor is it given to children; but it is chiefly used by weakened men and youths, and it therefore seems to be an exciting, and probably aphrodisiac remedy.

Varnish to Prevent Rust in Iron and Steel.—M. A. Vogel suggests that the oxidation of steel and iron is perfectly prevented by coating them with the following varnish:—White wax, one part, dissolved in fifteen parts of benzin. It is applied by means of a brush. The thin layer of wax forms a perfect covering, which, when needed, may be removed.—*Répertoire de Pharm.*

Non-Inflammable Fabrics.—In consequence of the lamented death of Mrs. Broadhurst, from her dress accidentally catching fire, there has been a considerable demand for the materials recommended for the purpose of rendering fabrics non-inflammable. We therefore refer our readers to a paper by Messrs. Versmann and Oppenheim, published in this Journal, vol. i. (New Series), pages 385 and 422, where a full description of the process will be found.

Escharotic for Toothache.—Dr. Calon, of Toulon, recommends the following formula of an escharotic for the speedy relief of toothache. The hollow tooth should be cleaned, and cauterized with a cotton plug, impregnated with dilute nitric acid, one drachm; acetate of morphia, one grain. As soon as the caustic has penetrated into the decayed cavity, the pain is relieved.

Condition of the Water supplied by the City Pumps.—Dr. Letheby, in his "Report of the Sanitary Condition of the City of London," observes that he had examined the water supplied to the City by the New River Company, and had

also analyzed the water furnished by twenty-two of the City pumps. The first-mentioned supply has not been objectionable; for the quantity of saline matter dissolved in the water has amounted to only 17.4 grains per gallon, and the organic matter to less than 2 grains (1.9). The chief constituents have been as follows:—Carbonate of lime 12.6 grains per gallon, sulphate of lime 1.9, alkaline sulphate 0.2, alkaline chloride 1.2, alkaline nitrate 1.0, silica and alumina 0.5, and organic matter with traces of ammonia 1.9. These results show that the water is of good quality, and is well suited for domestic purposes. Another advantageous property of the water is, that it is entirely without action on lead, and may therefore be stored in lead vessels, and distributed by lead pipes, without danger to the public health. The quality of the water supplied by the City pumps is very different from that of the New River, for instead of an average of only 19 grains of solid matter per gallon, the water contains from 20 to 127 grains. Taking the pumps in the order of their foulness, they stand as follows:—Bishopsgate Street Without, 127.3 grains per gallon; Aldgate pump, 109.5; Cock and Hoop Yard, Houndsditch, 89.2; Bishopsgate Street Within, 89; Bride Lane, 84.7; Bow Churchyard, 84.5; Fenchurch Street, 83.1; Little Britain, 83; Basinghall Street, 81.6; Chequer Yard, Dowgate Hill, 81.1; Bell Yard, Gracechurch Street, 80; Idol Lane, 78.5; Ironmonger Lane, 76.2; Bartholomew Lane, 75.3; Cornhill, 74.8; Bowling Square, White Lion Street, 71; Half-moon Passage, 70.5; Great St. Helen's, 53.3; Gutter Lane, 45.3; Honey Lane Market, 44.2; Guildhall Buildings, 28; and Glovers' Hall Court, 19.8. The quantity of organic matter in them ranges from 1.5 grains per gallon to 8.8; the common salt, from 2.7 to 25; the sulphate of lime, from 2 to 29; the alkaline nitrates, from 2.1 to 24.6; and the combined ammonia from 0.5 to 2 grains per gallon. These results show that the City pumps are not only charged with decaying organic matter, but also with the saline products of its oxydation—the ammonia, for instance, is a sign of present putrefaction, and the alkaline nitrates of a past; besides which, the existence of so large a quantity of common salt is suggestive of the filthiest impurities, as, for example, the fluid matter discharged from the human body, and the percolations from cesspools and sewers. Most of these waters are bright and sparkling, and they have a cool and agreeable taste. They are, therefore, much sought after for drinking purposes; but the coolness of the beverage and the briskness of its appearance are dangerous fascinations, for they are both derived from organic decay. Dead and decomposing matters have accumulated in the soil, and have been partially changed by its wonderful power of oxydation, and thus converted into carbonic acid and nitre. These have given to the water the agreeable qualities which are so deceptive. In reality the water from the City pumps is far worse than that from the muddy river, and it may at any moment become charged with the active agents of disease; for no one can say when the salutary influence of the soil may fail by being worn out or over-taxed, and then the putrid organic compounds will pass into the wells unchanged. Many of the pumps are in close proximity to the fat graveyards of the City, and it is more than probable that all of them derive their water chiefly from these sources, for they are the principal gathering grounds for the surface springs; in fact, they are the only open spaces through which the rain can percolate to reach the shallow wells.

Arsenical Toys.—A correspondent of the *Times* observes—"A child of mine purchased, at a respectable toy-shop, a toy which I believe is called 'Flying Butterflies.' The wooden part is of a bright green colour, which caused me to suspect that it was most likely 'emerald green.' Upon examination I found it to be so—*i. e.* a compound of arsenic and copper, or arsenite of copper, one of the most powerful of all the mineral poisons. The colour is not painted on with oil, but smeared on with water, and so it is easily removed by sucking, or by being placed in a glass of water.

"I may, with your permission, also state that I have examined several hanging-papers of various shades of green, in all of which I have detected an amount of this arsenite of copper which is really astounding, and the use of which must be, to say the least, dangerous."

Attempted Poisoning by Arsenic.—The Court of Assizes of Brabant, sitting at Brussels, has been occupied four days in trying a man named Delvaux, a teacher

by occupation, on the charge of having attempted to poison his wife. Notwithstanding the length of the trial, the facts of the case, as appeared in evidence, were few:—He lived at Ixelles with the woman, and, as she was always ill, he grew weary of her, frequently complaining to his neighbours that she was a burden to him, and even declaring that he would find means of getting rid of her. Some time back the woman, on taking a cup of tea, found that it had a bitter taste, and perceived that it contained a white substance; she questioned him, and he admitted having put a white powder into it, but declared that it was medicine, which would do her good. She, however, declined to drink the beverage. On numerous occasions afterwards she was seized with vomitings and pains in the stomach after partaking of food prepared by the man. She was, besides, often obliged to refuse to eat things he presented to her because the taste was bitter, and when she did so he used to fly into a passion, and to attempt by force to make her take them. On the 12th of May, after eating part of a sausage which he brought home, and of which he declined to partake, she was seized with the symptoms of poisoning; she sent for a medical man, and he, after applying remedies to the woman, found that the sausage contained arsenic. The husband was then arrested, and he had on him a quantity of that poison. The jury declared him guilty, and the court condemned him to death.

Accidental Poisoning by Laudanum.—A lamentable case of accidental poisoning has occurred at Bideford. Miss F. A. Rowland, governess to Lord Clinton's family, during a visit at Bideford, sent a prescription to Mr. Thomas Griffiths, chemist, to be dispensed. On taking the medicine she became very unwell, and died in a few hours. An inquest was held, when the following verdict was returned:—"Died from taking laudanum, inadvertently supplied by Thomas Griffiths instead of rhubarb."

Accidental Poisoning by Tincture of Aconite.—At Dollar, a short time since, Mr. Vaughan, finding himself unwell, went down stairs and took what he supposed to be an emetic, but which proved to be tincture of aconite. On the discovery of the mistake, a physician was sent for, but before he could arrive Mr. Vaughan was beyond recovery.

Attempted Suicides.—Charlotte Jeffrys was charged before Mr. Leigh, the magistrate, with attempting to poison herself by swallowing a large dose of laudanum. She was found by a policeman in a senseless state, and was carried to the London Hospital, where by the prompt application of remedies she was restored. At the Marlborough Street Police Court, Ann Wilson was charged with a similar attempt, by swallowing "white precipitate." By the administration of an emetic and the usual antidotes she recovered.

Suicide by Acetate of Lead.—Mr. Humphreys held an adjourned inquest on Tuesday, August 6th, at the Half-Moon and Crown, Swan Street, Bethnal Green, on the body of Benjamin Connor, aged 29, who committed suicide by swallowing a large quantity of sugar of lead, and stabbing himself through the heart with a pocket-knife. The deceased was a weaver, and had formed an attachment to a young woman; a quarrel took place, and the deceased proceeded to a chemist's shop in High Street, Shoreditch, where he purchased a pennyworth of sugar of lead, and when he reached the street he was seen to bite off the end of the paper, and swallow the contents. He then walked to a public-house and drank off half a pint of beer. He suffered excruciating pain, and the sister ran for medical aid, but before it arrived deceased had expired. Verdict—"Temporary insanity."

Suicide by Laudanum.—On Tuesday, August 13th, at the Marylebone Police Court, Inspector Gibson informed the magistrate that a woman named Sarah Garnett had died from the effects of poison. It appeared that the deceased was taken when drunk to the station, and soon afterwards was found apparently insensible. A doctor was sent for, who did all he could for a person supposed to be labouring under intoxication; but having been informed by the daughter of the deceased that her mother had told her that she had taken poison, and had given her a bottle labelled "Laudanum," the doctor altered his treatment, and used the stomach-pump. All remedies, however, proved unavailing.

Suicide by Prussic Acid.—Mr. Edward Casson, aged 33, who for nearly seven years had held the post of resident medical attendant at the Thorpe Lunatic Asylum, and who was only recently promoted to the situation of resident medical superintendent of the same establishment, at a considerable increase of salary, has commited suicide by taking prussic acid. Since the elevation of Mr. Casson to the position of superintendent, it appears that certain charges, the nature of which has not transpired, have been brought against him, and on Tuesday, July 30th, these charges were investigated by the committee of visiting justices. The result was, that upon the evidence adduced before them, and from Mr. Casson's own admissions, the committee unanimously recommended him to resign his situation in a month. Mr. Casson was reluctant to do this, but after being called before the committee a second time, he consented, and sent in a written resignation. Since then it was noticed that he was much depressed in spirits. On Friday, Aug. 9th, Mr. Casson sent to the shop of Mr. Cubitt, the chemist who supplied drugs to the asylum, for two one-ounce bottles of prussic acid, and on Sunday, at half-past twelve o'clock at noon, he was found lying dead upon the carpet in one of the rooms, a mug from which he had probably drained the poison standing on the table, and the two bottles for which he had sent to Mr. Cubitt lying nearly empty in a cupboard. On Monday, Aug. 12th, an inquest was held upon the body, before E. S. Bignold, Esq., and a verdict was returned that he died from taking prussic acid while in a state of extreme mental depression.

TO CORRESPONDENTS.

Patent Medicine Licence.—We beg to remind our readers that this licence expires on the 1st of September, and must be renewed within one month from that date.

J. V. T.—(1.) We do not know of any English translation of Dr. Mantegazza's essay. (2.) We are unable to give an opinion on the subject.

W. C. (Crewkerne).—Chloride of gold is formed by evaporating the terchloride to dryness, and exposing it to a heat of 440°.

F. (London).—(1 and 2.) Although the diploma of the Pharmaceutical Society has the force of authority in this country only, its possession would undoubtedly be of service under the circumstances alluded to. (3.) Yes.

A Reader (Leeds).—*Artificial Oil of Cassia* is made by moistening spongy platinum with fluid styrone, and exposing the mixture to the air. Styrone is produced by the action of caustic potash on liquid styrax. See *Pharm. Journ.*, vol. xv., page 180.

C. P. S. K. (Strood).—(1.) Of the labels sent for inspection No. 3 only is liable to the Medicine Stamp Duty. (2.) From two to four grains.

"*A Constant Reader.*"—The question is not within our province: consult a surgeon.

An Apprentice (Manchester).—Apply by letter, with name and address, to the Secretary, 17, Bloomsbury Square.

"*B.*"—(1.) *Gelatinization of Tincture of Kino.*—See *Pharm. Journal*, vol. i., page 399. (2.) The addition of a small quantity of dilute sulphuric acid is required.

An Associate (Birmingham).—We have heard nothing more of the proposed revival of the Branch Association.

Alpha (Leicester).—(1.) See page 155. (2.) Vol. xviii., page 197.

X. Y. Z.—The difference in the two cases is, that in one a sale only is effected, in the other advice is given.

R. A. (Brighton).—*Miscibility of Chloric Ether.* Vol. i. (second series), p. 304.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

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THE DIFFICULTY—IS IT PRESENT OR PROSPECTIVE?

The recent proposition to relax the Bye-laws of the Pharmaceutical Society in favour of Chemists who were in business before the passing of the Pharmacy Act, and consequently then in a position to be registered as Pharmaceutical Chemists, has given rise to much correspondence in the pages of this Journal.

It is not our intention now to discuss the wisdom or policy of that proposition; but certain misconceptions appear to be so general in the minds of the writers (especially of the earlier ones) that, although we have already endeavoured to correct some of them, and although, too, our correspondents of the last month seem more fully to appreciate the progress of the Society, it is yet desirable briefly to state the grounds on which any alteration in the Bye-laws touching the financial arrangements of the Society have been deemed necessary.

The *want of funds* has been spoken of by some as a matter of present necessity, as if some outstanding debt pressed for payment, and the Council were therefore willing on any terms to provide the means of meeting the demand. Mr. Hornsby says in his letter of August 17th, published in our September Journal,

"*What the 'pecuniary' wants of the Society now are I know not, for so far as I remember we have not had a direct official statement.*"

It is true that no official statement has been put forth; yet it is certainly right that the Members should have a clear knowledge of the facts of the case, and on this point we propose to offer a few remarks.

First, then, it should be understood that, although a large outlay has been made, the invested fund of the Society has not been exhausted, and we have no outstanding debts.

The error lies in the financial alterations which have been made from time to time since the formation of the Society, but chiefly in that which took place in 1852.

At the commencement of our Institution an establishment was formed on a certain scale for the advancement of Pharmacy, basing all such advancement on education, and deeming all outlay on that head justifiable.

It was considered necessary to engage the best lecturers of the day, to open a practical School of Pharmacy, a Library, a Museum, and an office for general business; thus making the Society's house a rallying-point for its Members. Also to circulate the Journal of Transactions for the benefit of those whose engagements, or distance from the metropolis, prevented their full enjoyment of these advantages, and as a bond of union for all.

At that time a Member's subscription was two guineas, an Associate's one, and a Life Member's fee twenty. After a few years it was deemed advisable to reduce these sums respectively to half their original amount.

Still matters went well, and a capital was accumulated which has enabled the Society greatly to extend its power of usefulness; but when the Pharmacy Act gave a certain status to Pharmaceutical Chemists, it was made a Bye-law of the Society that Members should pay *fees on entrance* instead of *annual subscriptions*. A more suicidal arrangement could not have been devised; but its evils did not become apparent until sufficient time had elapsed to reduce the *subscribing Members* to a certain point.

It is that point which the Society has now reached, when by the mere natural diminution of the number of those Members (not by secession), the annual income from subscribers ceases to be equal to the expenditure.

This diminution must increase annually, and in twenty years it is fair to calculate that few of those who entered before 1853 will remain.

The Society may then number as many Members as at present, but beyond the interest on funded property its income will not exceed six or seven hundred pounds per annum, the sum now received as "fees."

If provision be not at once made to avert it, the Pharmaceutical Society of Great Britain must then become simply a Board of Examiners with a Registrar.

The commutation fee of five guineas payable by an examined man, which we now invest in the "Life Members' Fund," is utterly out of proportion to the yearly subscription of a guinea, and Mr. Hornsby suggests the right remedy in his proposition to reduce the admission fee and substitute a subscription; indeed, this plan is the very groundwork of the alteration which has been discussed in Council, and accordingly drawn for the Bye-laws, and which in due course will shortly be brought before the Society for approval.

Some of our correspondents appear to be under the impression that the changes have already been made, but they should bear in mind that no Bye-law can be altered without a "General Meeting," at which each Member can back his opinion by a vote.

The admission of Chemists of 1853 was only one of the propositions submitted to the Council by a Committee specially appointed to consider our financial position; but, seeming to be one of great import, it was more prominently put forth than the rest, that the feelings of the Society generally should be elicited.

LICENCE FOR THE USE OF STILLS OR RETORTS.

We have received several communications recently on the subject of the licence granted by the Board of Inland Revenue for the use of stills. It appears that excise officers are serving notices on Chemists with reference to this subject, and we have been requested to state whether any, and what, new regulations are coming into operation. Having made inquiry on the subject at

Somerset House, we are enabled to state that the law which enables the Board of Inland Revenue to require Chemists, and others who use any still or retort, to take out a licence, is the same now as it has been for several years past. This law, as applied to England, was passed in 1846 (9th and 10th Victoria, cap. 90). It enacts that a licence duty of ten shillings should be imposed upon every person in the United Kingdom of Great Britain and Ireland, not being a distiller, rectifier, or compounder of spirits, who shall keep or use any still for carrying on the trade of a Chemist, or any other trade or business requiring the use of any still or stills, such duty to be payable annually. The Act gave the Commissioners of Excise a discretionary power of allowing the use of stills in certain cases without the licence, upon certain conditions being complied with; but it did not give to the excise officers the power of entering the premises where such stills were kept, and of examining them. Under these circum stances, the Board have, in many instances, allowed Chemists to use stills for making distilled waters without paying the licence duty, upon their giving notice of their having such stills to an excise officer, and permitting the officer to enter the premises and examine the still at his discretion. The ten shillings duty was thus given up for the right of entering the premises to see that no improper use was made of the still.

This regulation has been acted upon until the present time, but in the last session of Parliament an Act was passed (24th and 25th Victoria, cap. 91), the 23rd section of which is as follows:—

"Whereas by the Act passed in the ninth and tenth years of the reign of Her Majesty, Chapter ninety, an excise licence is required to be taken out by every person, not being a licensed distiller, rectifier, or compounder of spirits, or vinegar maker, who keeps or uses any still or retort: Be it enacted, that it shall be lawful for any officer of excise at any time (but if between the hours of eleven at night and five in the morning then in the presence of a constable or other lawful peace officer) to enter into the premises of every such person who shall take out such licence, or who shall use or keep any still or retort, and examine any still or retort kept or used by such person."

The excise officers being thus legally invested with the power of entering all premises where stills are kept, they have no longer any occasion to purchase this privilege by giving up the licence duty, and the Board, therefore, intend in future to require the licence to be taken out in all cases where a still or retort is kept or used *for the purposes of trade*, whether for distilling waters or anything else.

The law does not apply to stills or retorts which are merely used for experimental purposes, as in the case of scientific men who do not use them for the purposes of trade or profit.

ORIGINAL AND EXTRACTED ARTICLES.

NOTES ON CHINESE MATERIA MEDICA.

BY DANIEL HANBURY, F.L.S.

(*Continued from page* 11.)

橄欖 *Kan-lan;* Fruits of two or more species of *Canarium* (*Burseraceæ*); *Pun-tsaou*, fig. 668; Chinese Olive.

Most persons who have lived in China are acquainted with a small edible fruit, which, from its oblong shape and being generally sold preserved with salt, has acquired the name of *Chinese Olive*. The stones of this fruit are also well known from being frequently carved into beads and other ornaments. The Chinese olive, I need hardly observe, has not the least affinity with the true olive (*Olea Europæa* L.), but belongs to the natural order *Burseraceæ* and genus *Canarium*. The precise species, for there are probably two or three, are not well made out. Loureiro describes in his genus *Pimela*, now referred to *Canarium*, two plants yielding edible fruits, namely, *P. nigra* (*Canarium Pimela* Konig and Sims, *Annals of Botany*, vol. i., 1805, p. 361, tab. 7, fig. 1) and *P. alba* (*Canarium album* Raeuschel, *Nomenclator Botanicus*, ed. 3, 1797, p. 287).

Dried specimens of the fruits of these plants were presented to me by the late Mr. Reeves. That of *Pimela nigra* is an oval drupe $1\frac{1}{2}$ inches long, covered with a smooth black skin. The pulp, which is rather firm, surrounds a large, obscurely triangular, pointed stone. The fruit of *Pimela alba* resembles that of *P. nigra*, except that it is of a pale brown and has its outer skin much corrugated by drying.

Besides these and probably distinct from them, there are, according to my friend Mr. Lockhart, two other fruits used by the Chinese and commonly sold at certain seasons, the one at Shanghai, the other at Foo-chow. As I have not seen either of these fruits, I can offer no opinion upon them; but to those resident in the districts in question, I would address the request for specimens, including the pressed and dried flowers and leaves of the plants, in order that their botanical names may be determined. It is also desirable to ascertain in each case, how the fruit is used by the Chinese, by what names it is known and if the tree is cultivated or grows spontaneously.

川練子 *Chuen-lëen-tsze;* Fruits of *Melia* sp. (*Meliaceæ*); *Czuan-lan-tsy*, Tatarinov, *Catal. Med. Sinens.*, p. 15; *Pun-tsaou*, fig. 745.

A fleshy, globular drupe about an inch in diameter, covered with a shining, thin, horny, yellowish-brown skin, within which, surrounded by dried pulpy matter, is a large stony endocarp, furrowed longitudinally and containing seven or eight cells, of which however, not more than six are usually developed. Loureiro gives *Xún-lién* (Chuen-lëen) as the Chinese name of *Melia Azedarach* L., but the fruits of that tree are five-celled and much smaller than those in question. The drug under notice is used in China as a vermifuge.

大楓子 *Ta-fung-tsze;* Seeds of *Chaulmoogra* sp. (*Pangieæ*); *Pun-tsaou* fig. 773; *Da-fyn-tsy*, Tatarinov, *Cat. Med. Sinens.*, p. 19.

These seeds (fig. 9), which are imported into China from Siam, are from $\frac{4}{8}$ths to $\frac{7}{8}$ths of an inch long, of an oblong or ovoid shape, very irregular, owing to

mutual pressure in the fruit of which they formed a part. They consist of a hard woody outer shell (testa), to whose surface, portions of firm, dry pulp, or of the rind of the fruit, are often adherent,—sometimes so as to unite two or three seeds into a mass. The albumen is oily and encloses large, heart-shaped, leafy cotyledons.

The plant affording these seeds is not well ascertained. It is doubtless a species of *Chaulmoogra;* probably, judging from the resemblance of the seeds, nearly allied to the Indian *C. odorata* Roxb. The seeds of the latter plant are larger, and have a thinner and smoother testa than is the case with those found in the Chinese shops. Both seeds have a reputation as a remedy in skin complaints, especially in that most frightful of eastern diseases, leprosy. Dr. Hobson, late of the Canton Hospital, whose experiments appear to have been made with the seeds of the Indian *Chaulmoogra*, reports respecting them,* that he has found them to effect a cure in mild cases of leprosy, not of long standing; that the remedy (consisting of the powdered, oily nucleus of the seed) was administered in one-drachm doses twice a day during a period of four months or more, and that the expressed oil of the seeds was occasionally rubbed on the affected surfaces. The first appearance of improvement observed, was in the eruption becoming less prominent and red, minute white scales appearing round the circumference of the patches and the central parts assuming the character of healthy skin. Saline aperients are to be administered occasionally during the course of treatment.

FIG. 9.—Three seeds, natural size; longitudinal section of a seed; half-seed (testa removed) showing leafy cotyledon.

連翹 *Lëen-keaou;* Fruits of *Forsythia suspensa* Vahl. (*Oleaceæ*); Siebold et Zuccarini, *Flora Japonica*, p. 10, t. 3.

As found in Chinese commerce, these are little boat-shaped, brown capsules, ½ to ¾ of an inch long, with a thin longitudinal partition. They constitute the valves of the fruit, which, in its perfect state, is thus described by Endlicher:—"Capsula ovata, compressiuscula, sublignosa, corticata, bilocularis, loculicido-bivalvis, valvis planiusculis, medio septiferis. Semina in loculis pauca, pendula, compressa; testa membranacea hinc in alam angustam, inde in marginem angustissimam expansa. Embryo in axi albuminis carnosi, parci rectus; cotyledonibus foliaceis, radicula brevi, cylindrica, supera."†

I know not what virtues are ascribed to this drug: it appears to be devoid of any important property.

梧桐子 *Woo-tung-tsze;* Seeds of *Sterculia plantanifolia* Lin. fil. (*Sterculiaceæ*).

Spherical, about the size of peas, externally covered with a shrivelled, shining, pale-brown skin.

牛登茄 *Shing-tow-kea;* Berries of *Daphnidium Cubeba* N. ab E. (*Laurus Cubeba* Lour.); *Cây Mang tang* (Cochinchinese).

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* "On the Leprosy of the Chinese." *Med. Times and Gazette*, June 2, 1860, p. 558.

† *Gen. Plant.*, p. 573.

These are small berries, which, in size, form, and general appearance, much resemble peppercorns or cubebs, for which latter, in fact, they were mistaken by the friend who obtained them in China and gave them to me. Examined attentively, however, they are seen to be small, one-seeded globular berries (fig. 10) attached to a pedicel sometimes half an inch long; at the base of each berry traces of the perianth are visible. The pericarp is thin, fleshy, and in the dried state, corrugated. The seed is globular, with its cartilaginous, shining brown testa surrounded longitudinally by a narrow ridge. The cotyledons are hemispheral, thick, and oily; the radicle superior.

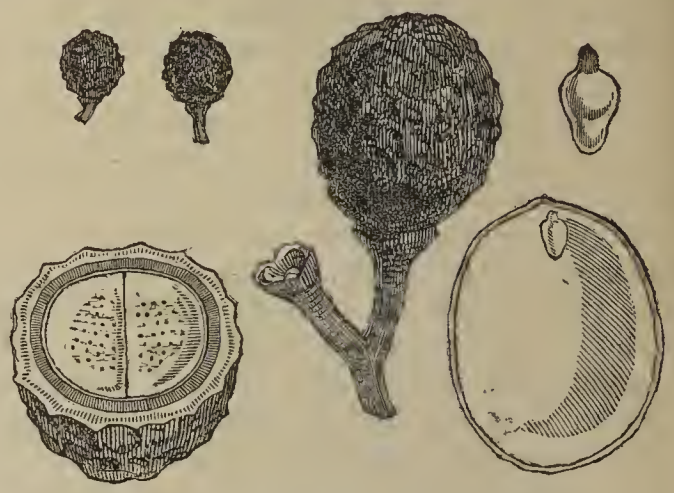

FIG. 10.—Two berries, natural size; berry magnified, and transverse section of ditto; cotyledon with radicle (magnified).

In endeavouring to assign a botanical origin to this drug, I have been guided chiefly by two considerations:—1. The evident laurineous structure of the berries. 2. Their superficial resemblance to cubebs. Turning to Loureiro's *Flora Cochinchinensis*, we find, under the name *Laurus Cubeba*, a tree described, the fruit of which so remarkably coincides with the drug under notice, that I cannot but conclude the two are identical. This tree was transferred by Nees ab Esenbeck, in his *Systema Laurinarum*, to the genus *Daphnidium*, but he borrowed the description of it from Loureiro, and had evidently examined no specimen—in fact, it is apparently unknown to recent botanists. Loureiro describes its fruit as "Bacca globosa, nigra, pedunculata, minima: semine globoso." He adds that the berries are strengthening, cephalic, stomachic, and carminative, and that in decoction they are useful in vertigo, hysterical affections, paralysis, melancholy, and impaired memory—properties which are possessed by the bark, though to a less degree. The fresh fruits are used for the preserving of fish. The odour of the berries is fragrant, their taste is aromatic, and somewhat pungent, and occasions a flow of saliva. They have the size, form, and colour of black pepper. Each berry is attached to a slender, rather long pedicel, whence they might be called not inappropriately *Piper caudatum*.

As Loureiro omits, in the case of the tree in question, to give its Chinese name, there is not, unfortunately, this usual confirmation, which I regret the more as I have not been able to identify the name *Shing-tow-kea* in any work to which I have access.* *Daphnidium Cubeba* is cultivated in Cochin China, and probably in Southern China also.

牙皂 *Ya-tsaou;* Legumes of *Prosopis?* (*Leguminosæ*); *Yà Caò* Cleyer, *Med. Simp.*, No. 223.

These are the pods of some leguminous tree at present undetermined, but which, judging from analogy, is probably not far distant from the genus *Prosopis*. They are from two to four inches long, and from $\frac{3}{10}$ to $\frac{5}{10}$ of an inch broad, more or less sickle-shaped and compressed, their upper edge prolonged into a narrow wing. The anterior extremity is pointed, the posterior attenuated into

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* There is a specimen of these berries at the Royal College of Physicians, labelled 蓼實 *Leaou-shih*, but I have reason to suppose this name is not correct.

a sort of stalk. The pods are indehiscent, and have thick, pulpy valves, which are externally smooth and of a deep brown. The substance of the pod, when chewed, even in very small quantity, produces an extremely disagreeable sense of acridity in the fauces. Its properties are thus quaintly described by Cleyer: "Intrat hepar et stomachum. Catarrhos solvit. Aperitivum est meatuum. Tumores complanat." The drug is said to be produced in the province of Szechuen."

草豉 *Tsaou-kow.*—Large Round China Cardamom, *Pharm. Journ.*, xiv., 353, fig. 1, 2.

Although this species of cardamom, as well as those that follow, have already been described and figured in the *Pharmaceutical Journal*,* it will probably add to the value of this paper, if I briefly recapitulate the characters by which they are distinguished, and the chief points of interest attaching to them.

The *Large Round China Cardamom* varies considerably in size, my specimens being from $1\frac{2}{10}$ inches to $\frac{6}{10}$ of an inch in length. The capsules are somewhat oval or globular, pointed at either extremity, obscurely three-sided (except at the base, where the triangular character is strongly marked); they are sometimes attached to a long pedicel. The pericarp closely invests the mass of seeds; it is brown, and strongly marked by interrupted longitudinal ridges; it is hardly aromatic. The seeds are coherent into a three-lobed mass; they are generally light greyish-brown, somewhat oblong and angular, with a deep furrow on one side; they have a slight aromatic odour and taste, the latter suggestive of thyme, though much weaker. This cardamom, as generally met with in the Chinese shops, has been deprived of its husk. It is a native of the South of China and of Cochin China, whence it is exported. It appears to be much employed in Chinese medicine as a stomachic, but it must be very inferior in power to some other species.

Small Round China Cardamom.—Cardamome ronde de la Chine.—Guibourt, *Hist. des Drog.*, éd. 4, tome ii. (1849), p. 215, fig. 113, 114 (excluding other synonyms); *Pharm. Journ.*, xiv., 354, fig. 3.

A smaller fruit than the preceding, which it much resembles. The following description of it is taken from M. Guibourt's *Histoire des Drogues*:—

"Capsules pedicelled, nearly spherical, from seven to eight lines in diameter, slightly striated longitudinally and much wrinkled in all directions by drying; it is probable, however, that the fruit was smooth when recent. The capsule is thin, light, easily torn, yellowish externally, white within. The seeds form a globular coherent mass. They are rather large and few in number, somewhat wedge-shaped, of an ashy-grey, a little granular on the surface and present on the outer face a bifurcate furrow, shaped like a Y. They possess a strongly aromatic odour and taste."

To this description I may add that, compared with the *Large Round China Cardamom*, the capsules in question are more wrinkled in a network manner, more fragile and thin, and (from immaturity?) much less adherent to the mass of seeds; they are more globose, not triangular at the base, but flat, or even depressed like an apple. Their colour, in all the specimens I have seen, is a brownish-yellow. I cannot confirm M. Guibourt's remark as to the highly aromatic properties of the seeds.

This cardamom, which appears to bear the same Chinese name as the foregoing, is attributed by M. Guibourt to the *Amomum globosum* of Loureiro.

草菓 *Tsaou-kwo.*—Ovoid China Cardamom. Fruit of *Amomum medium*

* "On some Rare Kinds of Cardamom." *Pharm. Journ.*, xiv., 352; also, *Journ. de Pharmacie et de Chimie*, Mai et Juin, 1855; *Bonplandia*, 1 Juni, 1855.

Loureiro, *Flor. Coch.*, ed. Willd. (1793), p. 5 (*Scitamineæ*) ; *Cao-go*, Tatarinov, *Catal. Med. Sinens.*, p. 5 ; *Pharm. Journ.* xiv., 419, fig. 9.

The *Ovoid China Cardamom* is a product of Southern China, and abundant in the drug shops of Singapore, as well as in those of China. It is an oval or oblong, three-celled, three-valved and obscurely three-sided fruit, of from 1 to $1\frac{3}{4}$ inches in length. The pericarp is of a dusky greyish-brown, deeply striated longitudinally, thick and coriaceous, frequently covered on the surface with a whitish efflorescence; it is but slightly aromatic. The seeds are very large, often upwards of three lines in length, sharply angular, hard and striated, having a powerful and peculiar aromatic smell and taste.

The seeds of the *Ovoid China Cardamom* are used by the Chinese for a variety of disorders, and, according to Loureiro, are also employed as a condiment.

Amomum medium is a plant known at present only through an unsatisfactory description by Loureiro in his *Flora Cochinchinensis.*

砂仁殼 *Sha-jin-kŏ.*—Capsules (deprived of seeds) of *Amomum xanthioides* Wallich. (*Scitamineæ*) ; husks of the *Xanthioid Cardamom.* *Pharm. Journ.*, xiv., 418, fig. 7.

These empty capsules are mostly attached to a common stalk, which, when perfect, is about five inches long and beset with the remains of sheathing bracts. The superior portion, which is much stouter than the rest, bears the fruits closely crowded together on short, bracted pedicels. No bunch in my possession bears more than twelve fruits, but from the number of pedicels on some specimens it would appear that the flowers at least are often twice as numerous. The capsules having been deprived of seeds are shrunken and compressed, but after soaking in boiling water they acquire their proper volume, becoming nearly spherical and about three-quarters of an inch in diameter. The pericarp is covered with long, acute, recurved spines, which are longest near the base.

Amomum xanthioides is a native of Burmah, where it was discovered by Wallich in 1827. It also occurs in the Laos country and Cambodia, where its fruits are collected for use. The plant being but little known, it was with much pleasure that I learned from Sir R. H. Schomburgk, by a note under date March 28, 1861, that he had just succeeded, after many endeavours, in procuring living specimens, which he had in cultivation at Bangkok, and from which he hoped to obtain flowers and fruits. The seeds of *A. xanthioides* deprived of their pericarp are sometimes sold in the London market as *Malabar Cardamoms*, for which they are not a bad substitute. To what uses the Chinese apply the husks, which are devoid of aroma, I am unable to say.

陽春砂 *Yang-chun-sha.*—Hairy China Cardamom. *Pharm. Journ.*, xiv., 354, fig. 4, 5.

A small scitamineous fruit supposed to be that of Loureiro's *Amomum villosum*, a Cochinchinese plant, of which very little is known. It is sometimes sold attached to the stalk, sometimes removed from it. The scape, which, when perfect, is about three inches long and reclinate, bears as many as eight or ten capsules upon its superior extremity. The capsules are from six to ten lines in length. In the dried state they are oval, occasionally nearly spherical, more or less three-sided, bluntly pointed, with a scar at the summit, rounded at the base, and attached by a pedicel one to two lines long. The pericarp is externally dark brown, marked with obscure longitudinal *striæ* and covered with asperities, which, after soaking in water, are seen to be short, thick, fleshy, closely-crowded spines. It has, when bruised, an aromatic and tar-like odour; the seeds have a similar tar-like odour and taste, not unmixed with the aromatic warmth of the Malabar Cardamom; they are angular, and upon removal of the pericarp, remain united in a three-lobed mass. The scape

is densely villous; the pericarp of the immature fruit is slightly so, but in the mature fruits this character is not observable.

This Cardamom is said to grow in the province of Kwang-tung, and in the Yang-yun district of Southern China. It appears to be frequently used in medicine by the Chinese, and is, no doubt, a good representative of the Elettaria Cardamom officinal in Europe.

益智子 *Yih-che-tsze.*—Bitter-seeded Cardamom. *Pharm. Journ. and Trans.*, vol. xiv., p. 418, fig. 8; *Pun-tsaou*, fig. 173.

The capsules are mostly oval, some ovate-oblong, and a few nearly spherical, pointed at the extremities, six to ten lines long. The pericarp is of a deep dusky brown, coriaceous, devoid of hairs, beset longitudinally with interrupted ridges usually about eighteen in number; it has an agreeable aromatic smell and taste. The seeds are obtusely angular and adhere firmly together; they are distinguished by an aromatic, *bitter*, *myrrh-like* taste.

It is not known what plant produces this little fruit. The MS. catalogue of the collection of Chinese drugs at the Royal College of Physicians of London, mentions the province of Kwang-tung as its place of growth, and it is also said to grow in the island of Hainan.

高良薑子 *Kaou-leang-keang-tsze.*—紅豆蔻 *Hung-tow-kow.*—Fruits of *Alpinia Galanga* Willd. (*Scitamineæ*); Galanga Cardamom, *Pharm. Journ.*, xiv., 420, fig. 10, 11.

Capsules about half an inch in length, of an oblong form, somewhat constricted in the middle, or occasionally pear-shaped; some are obscurely three-sided. Each fruit is prominently crowned with the remains of the calyx; in a few, the lower extremity is still attached to a slender pedicel. Most of the capsules are much shrivelled on the outside, apparently from having been gathered while immature; a few, however, retain a plump and smooth appearance. The pericarp varies externally in colour according to its maturity, from a pale to a deep reddish-brown; internally it is whitish. It is glabrous; in the mature fruits thin and brittle, not splitting into valves; in the shrivelled fruits it appears stronger, from its close adherence to the mass of seeds. Upon removal of the pericarp the seeds are seen united in a three-lobed mass, completely invested in a whitish integument, each cell or lobe containing, usually, two seeds, placed one above the other. The seeds are ash-coloured, flattish, and somewhat three-cornered; finely striated externally towards a large conspicuous *hilum* which faces the wall of the capsule, and which is connected with the axillary placenta by a long, broad *funiculus*. Each seed is nearly surrounded by a tough aril; opposite the *hilum* a scar-like depression is observable. The seeds have a pungent, burning taste, and aroma resembling the *Larger Galangal Root;* the pericarp is similarly aromatic and biting.

Authentic specimens of the fruit of *Alpinia Galanga* grown in the Calcutta Botanic Garden, and kindly placed at my disposal by Dr. Thomson, are identical with the Chinese drug.

東坡荳蔻 *Tung-po-tow-kow.*—Round or Cluster Cardamom. Fruit of *Amomum Cardamomum* L.; also called in Chinese *Hang-kow*, *Seaou-kow*, &c.

A well-known fruit, described in all the larger works on Materia Medica, but which in recent times had become rare, its place being supplied by the Malabar Cardamom (*Elettaria Cardamom* Maton), the seeds of which are very similar in odour and taste. Since, however, the opening of Siam to European commerce, Round Cardamoms have been frequently imported into London from Bangkok.

(*To be continued.*)

ON THE THEORY OF PRIMARY COLOURS.

BY J. B. KEARNEY, ESQ.

Professor Maxwell will most likely be glad to learn that he is not the only person who takes an interest in the theory of primary colours. I have made experiments with a prism almost daily for twelve months, and very frequently with stained glass, &c., in order to discover, if possible, what the primary colours are. I made all my experiments with the naked eye, it being my opinion that a telescope must, at least partially, mix the colours of the spectrum passing through it. My original idea was that I should have little difficulty in upsetting Young's theory, for I was so strongly prejudiced in favour of Mayer's or Brewster's theory, that to me few things seemed more absurd than to imagine that green or violet could be primary. I am now thoroughly convinced that Young is right and Brewster wrong, and I venture to lay before your readers a few of the facts on which my present conviction is based. Red is generally allowed to be a primary; I never met with any one who doubted it; but if there be such a person, perhaps the following may have some weight:—Red glass stops all colours of the spectrum except red, whereas red light will pass through glass of several other colours, as orange, yellow, brown, purple, &c.

One evening last summer, just before sunset, I saw a primary rainbow, whose only colour was red; it seemed to be (as it ought) about the same breadth as the sun. In a fog, when the more refrangible rays go almost everywhere else, the red rays alone reach the eye. But leaving red for the present, it is more likely that violet and green are primary than that yellow and blue are so. For we have it proved on a grand scale, every clear night, that violet is really the most refrangible colour, and not merely a mixture of the most refrangible and least refrangible colours; the final colour of the clear sky being always violet and never blue. Again, in the twilight we can see yellow objects long after green objects have become obscure; whereas if yellow and blue were primary and green a mixture of yellow and blue it ought to be just the reverse; for our eyes would, in that case, receive both blue and yellow rays from green objects, and only one set of rays from yellow objects. Neither yellow nor blue objects have their natural colour when viewed through a green medium; whereas both red and green objects may be seen through a yellow medium, and both violet and green objects may be seen through a blue medium, without any perceptible change of colour. If a thin strip of yellow be viewed through a white prism, two strips will be seen, one red, the other green. If a thin strip of blue be viewed through a white prism, two strips will be seen, one violet, the other green. White light is dispersed by refraction through a yellow or orange medium into red and green. White light is dispersed by a blue medium into violet and green. Neither a green medium nor a violet medium disperses white light. During the past year I have seen many mock suns; they were all red inside (*i. e.*, towards the sun) and green outside. During the same period, I have also seen many specimens of the primary rainbow, and a few specimens of other rainbows and halos, which had only red and green; but I never saw or heard of a primary rainbow, or any simple halo, terminating in yellow or blue. The small halo, red (outside), orange, and yellow, so often seen round the moon and occasionally round the sun, is only an apparent exception, being, in fact, compounded of two halos which overlap each other. On July 1st, I saw the broad halo of 52° radius; the colours were red, green, and violet, not blent into each other, as the colours of the primary bow always are, but quite homogeneous and distinct. As this was a simple halo and not caused by minimum deviation pencils from each point on the sun's disc, but by pencils which, though parallel when they meet the eye, set out from the sun in a state of convergence,

and, therefore, required a sensible breadth of the sun's disc to produce each point in the halo, it had the best chance that I can imagine of displaying the primary colours, particularly when we consider the breadth of dispersion. Once, towards sunset, the solar spectrum began with red and ended with green.

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On the Freezing and Boiling Points of Water.—M. L. Dufour has communicated to the French Academy the results of some interesting experiments showing that water and certain other substances may be maintained in the liquid condition at temperatures much beyond the point at which they usually pass into either the solid or vaporous state, by placing them in a fluid menstruum of the same density as themselves, and with which they are not miscible. Globules of water thus suspended in perfect equilibrium retain the fluid condition through a much longer range of temperature than is possible under other circumstances.

The boiling point of liquids is known to vary considerably, and to be particularly affected by the nature of the vessel in which the liquid is contained. With water the boiling point is higher in a glass than in a metallic vessel. When the surface of the glass has been specially cleansed with oil of vitriol the discrepancy becomes still more marked. When placed under the conditions of a water hammer, in which it is entirely freed from air, and contained in a glass tube, Donné has shown that it may, by careful heating, be raised to 135° Cent. without passing into the vaporous condition. The deviation in such cases is attributed to the force of adhesion existing between the liquid and the surface of the vessel, and the absence of air from solution.

In M. Dufour's experiments, however, the result cannot be attributed to the absence of air, or to the adhesion of the liquid to a solid; on the contrary, contact with a solid produces an instant gush of vapour. His first experiment is as follows:—Some linseed oil is heated in a dish to 105° C. or 110° C., and a few drops of water dropped in, which sink to the bottom of the vessel. The moment they touch a sudden formation of vapour takes place, and the globule, a little lessened, is repelled a short distance from the bottom. It again sinks till it touches, when it again boils and is again repelled. While the globule is floating through the oil no evaporation takes place; it is only on coming into contact with the solid that vapour is formed.

M. Dufour's next experiment consists in using a medium having the same density as water, and in which, consequently, the globules remain in equilibrium, permanently floating in the centre. The medium being capable of bearing a temperature above 100°, and not being miscible with water. Essence of cloves, to which a small quantity of oil has been added, constitutes a fluid answering to these conditions. Water remains floating in round spheres with perfect freedom of motion in the centre of this mixture. Under these circumstances, if heat be carefully applied, a temperature far above 100° Cent. may be obtained without the ebullition of the water ensuing. 120° or 130° C. is frequently reached, and spheres of water 10 millimetres in diameter have been thus raised to 140° and 150° without changing. Smaller spheres, one to two millims. in diameter, have been raised to 170° and even 175° C.; that is to say, a temperature at which steam has a tension equal to eight atmospheres (or 112 pounds). The water used had not been prepared; it was neither distilled nor freed from air. At these high temperatures the globules were as calm and transparent as at 10°. When the globules came into contact with a solid, then ebullition instantly ensued. If carried against the side of the vessel or against the bulb of the thermometer, a sudden formation of vapour was the result, and the globule was repelled some distance from the point. By touching the globule when at 115° or 120° with a glass or metal rod, or better, a point of wood or charcoal, a similar effect was produced ; an explosive formation of steam taking place, and the globule being driven away as if the point had exerted some repulsive force.

These phenomena may also be produced with other liquids treated under the same

conditions. Chloroform may be so heated when floating in a solution of chloride of zinc to a temperature of 90° or 100° C.

By means similar to the above, M. Dufour has equally succeeded in retarding the freezing of water. A mixture of chloroform and oil of sweet almonds is made, in which globules of water float in equilibrium. By cooling the mixture, the water scarcely ever freezes at 0° C. Its temperature sinks to —6°, —10° before congelation occurs, and globules have been even reduced to —20° C. without solidifying. Ultimately the globules either pass into solid grains of ice, or simply freeze on the surface, depending on the size and amount of reduction in temperature. The persistence with which the water retains the liquid state is, however, remarkable. The mixture containing the globules may be shaken, and foreign bodies introduced, without solidification resulting. By touching the sphere, however, with a lump of ice, congelation is immediately effected. When one globule solidifies, the congelation of others still fluid may be effected by bringing them in contact with the frozen particle. Different effects are thus produced, depending on the temperature and the size of the spheres. Sometimes the spheres touching solidify suddenly, but remain separate; sometimes they combine together, the one joining on or else enveloping the other at the moment of congelation. Irregular spheres formed of concentric layers and other varied shapes are thus produced. The author traces a resemblance between these frozen particles and the shape and structure of hailstones, which he conceives may be formed by a process somewhat analogous.

Other substances besides water present the foregoing phenomenon. Thus M. Dufour has experimented with sulphur, phosphorus, and naphthaline. He finds that when melted sulphur is suspended in a solution of chloride of zinc having the same density as itself, the temperature may be reduced to 70° or 50° without solidification taking place. In this instance, the liquid condition possesses remarkable stability. When the globules of sulphur remain fluid at 50° or 60° below the usual temperature of solidification, their change of state constitutes an interesting object. Globules half a millim. in diameter sometimes remain liquid at 5° C. for several days. Solidification is best provoked by contact with a piece of sulphur. Phosphorus in like manner may be reduced far below 44° C. without solidifying, and small globules may even be reduced to 5° or 0°. Many other substances would doubtless present the above phenomena. The principal obstacle lies in the difficulty of finding suitable menstrua.

Formation of the Green Matter of Leaves under the influence of the Electric Light.—M. Hervé Mangon has published the results of some experiments made by him, with a view of ascertaining whether the green matter of leaves, &c., would be formed when a plant was submitted solely to the influence of the electric light. It is well known that a plant grown in darkness is devoid of green colour, and it is generally considered that the sun's light is essential to its development. From M. Mangon's experiments it appears that the electric light is equally capable of inducing its formation.

The electricity was produced by an electro-magnetic machine worked with a steam engine. The light was obtained from a lamp with charcoal points. The light was maintained for eleven hours on the 30th July, twelve hours on the 31st July and 1st and 2nd of August, and eleven hours and a half on the 3rd of August. The temperature of the air varied from 22° to 25° C., and the earth from 19° to 21° C. In the morning of the 30th July several flower-pots, each containing four grains of rye, sown respectively on the 24th, 26th, 27th, and 28th of July, were placed in a large space perfectly secluded from external light, the pots standing about one metre from the electric lamp, and half a millimetre below the point of light. The grains sown on the 24th and 26th had sprouted, the stems being about 0.^{m}005 to 0.^{m}012 in length. One of these small plants presented the commencement of a green tint at the point, the others were white. By the middle of the day of the 31st the plants of the 24th and 26th had grown to 0.^{m}01 and 0.^{m}06 in length; they were *very green*, and strongly inclined towards the light. The plants of the 27th had sprung up and were green at the tips. By the 2nd of August all the plants had developed as well as if they had been in the open air, and all exhibited their natural green colour. On the 3rd of August the experiment was brought to

an end. It is scarcely necessary to add that some corresponding seeds grown in darkness for the same period were perfectly yellow.

It follows from the above that the electric light, like sunlight, is capable of causing the development of the green parts of plants. It has been previously shown that the light resulting from very intense combustion, such as results from pyrotechnic compositions for instance, is capable of producing the same effect.

On Resin of Scammony.—M. H. Spirgatis has published a paper on the constitution of resin of scammony. He prepares the resin in a state of purity by the following process. The crude resin is powdered and treated several times with alcohol. The alcoholic solution is diluted with water, until it exhibits a slight turbidity, it is then decolorized with animal charcoal. After filtration a part of the alcohol is distilled off, water is added to the remainder, which is then heated over the water-bath until the resin has all separated. The resin is next treated for some time with successive quantites of water over the water-bath; the first washings are very acid; they contain some volatile acid, probably butyric, or valerianic. The resin thus purified is amorphous, colourless, and transparent, inodorous, and insipid. Its composition the author states to be identical with that found by M. Meyer for jalapine, C_{68} H_{56} O_{32}. It fuses at 150° C. into a colourless liquid, which becomes brown, and decomposes at a higher temperature. It is soluble in all proportions in alcohol, in ether, and in benzine. Nitric acid added in small quantity to the alcoholic solution is without action, while it turns the tincture of guaiacum green and then brown. Alcoholic solutions of acetate of copper and acetate, or subacetate of lead, give no precipitates. Nitrate of silver and perchloride of iron are also without action.

The pure resin is completely dissolved by potash, soda, ammonia, or baryta water. The acids separate nothing from these alkaline solutions, because the resin is transformed into an acid, scammonic acid, which is a yellowish, transparent amorphous substance, very hygrometric, having an acid and bitter taste. Its composition and properties, the author states, are identical with jalapic acid.

When resin of scammony, or scammonic acid, is treated with strong acids, such as sulphuric or hydrochloric, it splits up into glucose and an acid insoluble in water, soluble in alcohol and ether, from which solutions it crystallizes in mammillary groups of microscopic needles. This acid is named scammonolic acid, and presents the composition C_{32} H_{30} O_6, which is that attributed to jalapinolic acid. The author appears to regard scammonine and its derivatives as identical with jalapine and the bodies obtained therefrom. Jalapine, however, yields by acids jalapinol, a body distinguished from jalapinolic acid by one atom of water, and by its properties being less decidedly acid. This intermediate body has not been produced from scammony.

The scammonolate of soda (C_{32} H_{29} NaO_6) crystallizes in fine white needles, soluble in water and alcohol. Its solution is precipitated by salts of baryta, lime, silver, copper, and iron. The scammonolates of potash and ammonia are analogous to the soda salt. That of baryta is deposited in fine needles when baryta water is poured into a hot alcoholic solution of scammonolic acid. It contains C_{32} H_{29} BaO_6. The salts of lead and copper are amorphous, their composition is analogous to the preceding salts.

Scammonolic ether is formed when a current of hydrochloric acid gas is passed into a solution of scammonolic acid or scammony in absolute alcohol. When the liquid is afterwards mixed with water, the ether separates in the form of an oil, which, purified by solution and precipitation with water, can be obtained in the crystalline state. It fuses at 32.5. Its composition is represented by the formula C_{32} H_{29} (C_4 H_5) O_6.

Solubility of Arsenious Acid in Glycerine.—M. Cap has directed the attention of Pharmaceutists to the solvent power of glycerine for arsenious acid. Equal equivalents of the two substances combine, yielding a viscous oil which solidifies at the freezing point (32° F.), when it presents the appearance of an ordinary fat.

Valuation of Nitre.—M. Persoz has described a ready means of determining the per-centage of nitric acid in impure nitre, which may be of value to the chemist in many cases. It consists in mixing the nitrate with twice its weight of bichromate

of potash, previously fused and powdered, and carefully heating the mixture until no more fumes are disengaged. The bichromate is without action on the sulphates and chlorides, but it readily decomposes the nitrate, chasing out the nitric acid. The loss of weight by heating, therefore, indicates the quantity of nitric acid. As bichromate of potash alone undergoes decomposition by heat, care must be taken to regulate the temperature employed; the limits, however, are sufficiently large to admit of this error being readily avoided.

Action of Nitrous Acid on Salts of the Suboxide of Copper.—M. E. Lenssen points out that when a drop of fuming nitric acid is added to a strongly acid solution of subchloride of copper, a deep indigo blue colouration is formed. The same reaction is produced with nitrite of potash. It is due to the action of nitrous acid on the subsalt of copper, because neither gaseous binoxide of nitrogen nor diluted nitric acid freed from nitrous acid, is capable of producing it. The blue colouration the author states is very characteristic, and will serve to recognize nitrous acid. When the cuprous solution is very dilute, however, it is difficult to distinguish the colour from that of a cupric salt.

ON THE USEFUL PLANTS OF PARAGUAY.

BY DOMINGO PARODI.*

(*Continued from page* 20.)

Caápirí-ropitá (Guarani), *Canchalagua* (Spanish); Nat. ord. *Compositæ*. Possesses tonic and febrifuge properties.

Caá-hay (Guar.), *Verdolaga palustre* (Span.); Nat. ord. *Portulaceæ*, genus *Portulaca*. A decoction of the leaves and roots is employed in dysentery, malignant fever, and also in inflammation of the kidneys or bladder.

Caáobetí (Guar.); Nat. ord. *Cedrelaceæ*. A white wood, but little used.

Charrua or *Macaguá-caá* (Guar.), *Teucrio* (Span.); Nat. ord. *Labiatæ*, genus *Teucrium*. A reputed remedy for the bites of serpents.

Cardo Santo, *Chicalote*; Nat. ord. *Papaveraceæ*, genus *Argemone*.

Curugûay (Guar.), *Habas del aire* (Span.); Nat. ord. *Leguminosæ*, genus *Dolichos*. The seeds, known as *Œil de bourrigue*, are used for an amulet for a cold.

Cumandá-pitá (Guar.); Nat. ord. *Leguminosæ*, genus *Dolichos*. A common climber, the pods of which attain a length of more than a foot, and have large flesh-coloured seeds, which are reputed efficacious against snake-bites.

Curuguá (Guar.), *Melon de olor* (Span.); Nat. ord. *Cucurbitaceæ*, genus *Cucurbita*. A twining plant that produces a fruit of the form and size of a common melon, with smooth, shining, blackish rind; this fruit the inhabitants are accustomed to place in their houses on account of the penetrating aroma which it for a long time diffuses.

Guapoí-aici (Guar.), *Balsamero* (Span.); Nat. ord. *Terebinthaceæ*, genus *Icica*. Some confusion exists between the various trees which afford the aromatic resins commonly known as *Incense*, *Tacamaca*, *Ici*, &c.—products all belonging to different genera of the same family, as *Amyris*, *Bursera*, and *Icica*. The resin known here as *Trementina del pais* or *Ici* is however, as to its physico-chemical properties, identical with the Brazilian Elemi obtained from *Icica Icicariba*. It is reputed useful in internal ulceration, both of the lungs and intestines, and especially of the kidneys and urinary passages.

Guavira (Guar.); Nat. ord. *Myrtaceæ*, genus *Myrtus*. An edible fruit, of not very agreeable flavour.

Guavirá-mí (Guar.); genus *Myrtus*. This shrub grows spontaneously in the forest forty leagues north of Asuncion. Its fruit, considered the most excellent of the wild fruits of this country, is a little berry, having a thin aromatic external skin, within which is a white pulp of acidulous and agreeable flavour. From the berries, submitted to fermentation, is prepared an excellent liqueur known as

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* *Revista Farmaceutica de Buenos Ayres*, April, 1861.

Aguardiente de Guavirá-mí, to which tonic and stomachic properties are attributed. Plantations of the shrub have been made on some estates in the environs of the town, and prosper well. Of the four varieties of *Guavirá*, this is that most used in medicine as an antidysenteric. Its tonic and astringent properties reside in the leaves and roots, of which an aqueous or vinous infusion is taken in small doses at short intervals.

Guaviyú (Guar.); Nat. ord. *Myrtaceæ*, genus *Eugenia*. Fruit edible.

Guaviyú-miní (Guar.), *Brusco* (Span.); Nat. ord. *Asparagineæ*, genus *Ruscus*.

Guaichí-picha (Guar.); Nat. ord. *Malvaceæ*, genus *Malva*.

Guembé (Guar.), *Pothos pinnatifida* (*Aroideæ*). A parasite growing generally on large trees. From the bark of the aërial roots cordage is made, which decays but little in water; baskets and mats, painted with fanciful designs, are also made from it by the Indians. The seeds have a sweetish taste, and are edible; the incinerated bark is imagined to be anthelmintic.

Guembé-taya and *Guembé-y* (Guar.), *Aro dulce* (Span.); Nat. ord. *Aroideæ*, genus *Arum*. Leaves and roots edible.

Granadilla. Under this name are designated certain spiny shrubs, which appear to me to belong to the family of *Rhamneæ*, although, from their bitterness and other properties, they nearly assimilate to the Quassias. The decoction of the root is successfully used in alvine fluxes, and especially in chronic dysentery. This plant must not be confounded with the passion-flower, also called *Granadilla*.

Iyxú (Guar.), *Cúscuta* (Span.); Nat. ord. *Convolvulaceæ*. A parasitic plant with whitish shoots as thin as threads, climbing over the trees in great abundance; the singular effect produced by the filaments of this plant suspended in the rounded crowns of the trees produces the resemblance to an enormous head covered with grey hair, whence one of its names *Barba de Viejo* (old man's beard). The filaments are used in the place of straw or tow in stuffing mattresses, also the skins of animals which it is required to preserve.

Ibá-ey (Guar.), *Palo de Trébol* (Span.); Nat. ord. *Leguminosæ*, genus *Myrospermum*. A tree having a white wood with a balsamic odour; on which latter account it is generally known under the name *Palo de trébol* (trefoil wood).

Ibá-hay (literally *sour-fruit*); *Ibá-namichay* (*hanging-fruit*); *Ibá-proti* (*Deciduous-fruit*); *Ibá-porey* (*useful-fruit*); Nat. ord. *Myrtaceæ*, genus *Myrtus*. The berries of these four myrtles are edible, and from some of them conserves are prepared. From the *Ibá-hay* good vinegar is made.

Ibá-purú or *Guapumí* (Guar.); *Myrtus*. These are blackish acid berries of the size of a cherry, whose outer-skin contains a red colouring matter of a brilliant shade, but which is not stable under the influence of light or alkalies. The fruit is eatable; a vinous liquor called *Chacoli* is prepared from it, also a sweet conserve, which latter, however, is too acid and astringent to be very agreeable. This plant is remarkable for the peculiar manner in which it produces its fruit, which grow on the main stem between the collar of the root and the point of insertion of the branches.

Ibáró or *Casita* (Guar.), *Arbol del Jabon* (Span.); Nat. ord. *Sapindaceæ*, genus *Sapindus*. The root, wood, and especially the fruit, of this tree are impregnated with a bitter principle, which, dissolved in water, makes it froth as does soap, some of the properties of which it possesses—though it is far from supplying the place of that substance for domestic purposes. The Jesuits have caused alleys of this tree to be planted between the villages and the public fountains, in order to encourage its use by the Indians. The hard, shining, black seed is used for necklaces, rosaries, and children's toys; its nucleus is yellowish, oily, and not edible.

Ibirá-pepé. A yellow, compact wood, used for furniture.

Ibibaró (literally *Bitter-wood*); Nat. ord. *Bignoniaceæ*. A tree of smaller dimensions than the *Tayi* or *Lapacho*, of which it seems to be a variety; its hard and heavy wood is used for the felloes and spokes of wheels, for posts, beams, and planks; it is one of the more durable woods, as well for buildings as for naval purposes.

(*To be continued.*)

ON THE NEW ANÆSTHETIC KEROSOLENE.

BY EPHRAIM CUTTER, M.D., OF WOBURN, MASS., U.S.

This new anæsthetic, kerosolene, is obtained as a product, which hitherto has been thrown away as useless, in the manufacture of kerosene oil by the destructive distillation of coal, not coal-oil nor tar. If I understand it aright, the crude volatile matters that come over from the still at a temperature of 150° Fahrenheit, are condensed and treated with sulphuric acid, and then redistilled. The result is the article you see before you. It may be largely produced. I am informed that from forty to sixty thousand gallons could be annually made by one establishment alone in Boston from the waste of the usual course of manufacture for that period. It could be furnished at a dollar a gallon.

The chemistry of the article has not been described. It has been named by the discoverers kerosolene or keroform, possibly under the impression that it may be a new organic radical, or a compound of a new organic radical. Whether this has been definitely determined by analysis is not known. From its mode of production, specific gravity, physical and physiological properties, one would fain class it as an ether or an analogous hydrocarbon. Kerosolene is a beautiful colourless and volatile liquid, with a specific gravity of 634 (roughly determined). Ether has a specific gravity of about 750, chloroform 1.49. Tested with litmus paper it was found neutral. As regards the appearance to the sight, it cannot be distinguished from ether. The odour is not peculiar and hardly perceptible, and what is perceptible is very pleasant, resembling that of chloroform. It leaves no persistent smell in the apartment where it is evaporated. In this respect it is very much superior to ether, and is not so sickish as chloroform. It is tasteless. It evaporates wholly on exposure. A given quantity of ether and kerosolene was evaporated in capsules floating in water at a temperature of 108° F. The ether disappeared first. It is highly inflammable. Besides the odour just mentioned, there is a faint smell, like kerosene-oil. It seems as if the specimen examined was not chemically pure, but contaminated with a small quantity of the kerosene-oil. (The different samples seen have varied some in regard to this kerosene odour. The second sample contained much more than the first, and occasioned a slight headache upon inhalation, which a third did not, having very much less of the kerosene odour.) This suspicion is confirmed by agitating the kerosolene with twice its bulk of water. The phenomena witnessed are the same as are seen when ether is similarly treated, only that the kerosolene forms larger and more persistent balls, and the water is much more and longer turbid. A portion allowed to stand twelve hours after agitation with the water presented a distinct layer of oily matter, between the upper surface of the water and the lower surface of the kerosolene. Ether furnished a similar one, but not so distinct and voluminous.

The vapour applied to the skin, as is sometimes done with chloroform in neuralgia, is irritating, but not to the same degree as that of the latter. The first intimation that this substance had anæsthetic properties was declared by the fact that an Irishman, sent in to clean out a still, became totally insensible. Upon being withdrawn, and recovering his faculties, he expressed himself as having had a very fine "dhrame." The article was thus suspected: a quantity of it was procured, and given to mice and flies. One mouse was killed by it. Mr. W. B. Merrill, an *attaché* of the works (Downer Kerosene-Oil Co., Boston), then introduced it to the notice of Dr. H. J. Bowditch, who in turn called the attention of the Boston Society of Medical Improvement to it. This body appointed a commission to examine into its claims. In prosecuting their inquiries, Dr. H. J. Biglow was probably the first to try it upon the human subject, and that subject was himself. He also exhibited it to some patients. An account of his experiments was published in the *Boston Medical and Surgical Journal.*

The writer has experimented upon himself and others. In my own case it was given to me by my friend and student, Mr. S. W. Abbott. I remained under its influence full half an hour twice. Perhaps four ounces of the kerosolene were consumed in each trial. The first impression is sudden, powerful, and pleasant. Almost immediately I passed into a state of pleasurable insensibility, which at no time was perfect. At least there would be responses to the pricks of a pin, and the

muscles were not quiet—although afterwards I had no recollection of any such thing. The pulse and respiration were not much altered from their normal rate, the face was rather pale. At the first trial Mr. Abbott states that I travelled about and grasped the napkin on which the kerosolene was found with my teeth, so strongly that he could hardly get it away. The stimulus of the vapour penetrated the whole frame, even to the tips of the fingers. No unpleasant effects have been experienced from the two experimentations, except a slight headache, which I think may be due to the presence of the adventitious kerosolene.

As you breathe the vapour, you seem to float away into a wavy maze, with a sense of complete loneliness. There appears to be but one object in the universe, and that object is yourself. On recovery, the first thing seen is deemed the next only existence in the universe. It takes some little time to regain all the faculties.

At the meeting at which the above was read, quantities of the kerosolene were distributed, and several of the gentlemen of the Society inhaled it in the presence of the assembled company. They came under its influence immediately, and also recovered from it well. Dr. Ingalls reported two trials of its external use in cases of neuralgia, in one of which it succeeded. The mode of procedure is to moisten a pledget of cotton-wool with the kerosolene, lay it upon the skin, and cover it with a watch crystal.

From the above trials it is proper to infer that kerosolene is a very fit article for further experiment. It must be presumed to be almost safe, as in all the trials of it upon man and the lower animals, only a mouse has been killed. Its price, odour, and instantaneousness of action are advantages over ether.—*American Medical Times* and *Dublin Medical Press.*

THE CINCHONÆ IN INDIA.

In our October number, we alluded to the mission of Mr. Clements Markham in introducing into this country the quinine-yielding plants of South America. We regret to learn that the plants brought by Mr. Markham have all perished. They suffered so much from exposure to cold, in his journey across the Cordilleras, that very few of them survived the voyage to England, and from thence overland to the Western Coast. Cuttings were made by Mr. McIvor from some of the most promising looking plants, and it was hoped that these might be propagated; but by the latest accounts we understand that all have perished. A second supply of young plants of the grey and yellow bark have lately been received, as well as seeds. The plants, it is understood, are in a very unsatisfactory condition; but there is every hope that the supply of seeds will enable Mr. Markham to establish the practicability of growing the cinchonæ in this country. Mr. Markham has recently stated, in a letter to the *Madras Times*, that a further supply of plants and seeds is expected from the Ecuador, and that arrangements have been made with duly qualified agents to continue sending supplies of both, so long as may be necessary. Attempts will at the same time be made to naturalize the cinchonæ in the hills of Jamaica and Ceylon. It is well known that the Dutch have successfully introduced these valuable plants into Java. They have now upwards of half a million of young trees planted out, chiefly of the Calisaya species; and it has been satisfactorily proved that a higher per-centage of alkaloid is obtainable from the trees grown in Java, than from those which have flourished in their native forests. So jealous, however, are the authorities of their success in the experiment, that Dr. Macpherson, on a late visit to the island, was prohibited from bringing away with him a single plant or seed. Dr. Macpherson's description of the mode of culture practised in Java, we shall probably have the pleasure of publishing in our next number.—(*Madras Quarterly Journal of Medical Science.*)—*British Medical Journal.*

ON TINKALZITE (BORATE OF LIME AND SODA), FROM PERU.

BY T. L. PHIPSON,
Phil. Nat. Doct. Bruxelles University; Member of the Chemical Society of Paris, &c. &c.

The useful mineral of which I am about to speak was discovered only a few years ago in the deposits of nitrate of soda in Peru. It is now imported into Europe in considerable quantities as a substitute for borax. It was first examined in 1850 by

M. Ulex, who found that it contained boracic acid, lime, and soda; but the analysis published by this author shows too small a quantity of water, and too much boracic acid. In 1859, M. Kletzinsky received some samples of this same mineral from the Western Coast of Africa, and the analysis he has made of them coincides pretty well with my analysis of some specimens from Peru.

Tinkalzite is found in the layers of nitrate of soda of Southern Peru, in the shape of globular masses, which the natives call *tiza*, and which vary in size from that of a nut to that of a potato. The outer crust of these tubercles is rather hard; but they are easily broken, and are then seen to be formed, in the interior, of a mass of crystalline needles, intersecting each other in all directions, and of a brilliant white satiny appearance. Often these globular masses contain reddish crystals of gypsum and other minerals; and they always contain a certain quantity of common salt, which g ives to the mineral a brackish taste.

Water extracts from tinkalzite all its chloride of sodium and borax; acids easily dissolve the whole mineral, leaving only a small residue of very fine sand.

The density of tinkalzite I find to be 1.93 (according to M. Kletzinsky, = 1.9212; and according to M. Ulex, the satin-like fibres = 1.8).

The analysis of the mineral in question has given me the following result, by the side of which I have placed the analysis of M. Kletzinsky:—

	American Tinkalzite. Phipson.	*African Tinkalzite.* Kletzinsky.
Water	34.00	37.40
Soda	11.95	10.13
Lime	14.45	14.02
Boracic Acid	34.71	36.91
Chlorine	1.34	1.33
Sulphuric Acid	1.10	0.50
Silica	0.60	"
Sand	2.00	"
Phosphoric Acid	traces	"
Alumina	"	"
Magnesia	"	"
	100.00	100.00

The difference in the quantities of water, as shown in these two analyses, is owing to the gradual loss of water by soda-salts when exposed for some time to the air.

By neglecting the accidental elements, and calculating the water, soda, lime, and boracic acid, we arrive at the formula—

$$(Na\,O, 2\,Bo\,O_3 + 10\,HO) + 2\,(Ca\,O, Bo\,O_3 + 2\,HO) + 2\,HO.$$

Borax. Borate of lime. Water.

The presence of the other substances given by analysis seems to indicate that this mineral has been formerly deposited by mineral springs; and the fact that the biborate of soda it contains has crystallized with 10 equivalents of water, shows that the temperature of these springs could not have been greater than +55° (Centigrade). As it is imported from America for industrial purposes, tinkalzite contains about 60 per cent. of borax, 25 per cent. of borax of lime, and 2½ per cent. of chloride of sodium. It forms an excellent flux for metallurgical purposes, and has been employed with success in the porcelain manufactories of Sèvres by M. Salvetat. In fact, it appears capable of effectually replacing borax in all the applications of this rather expensive salt to industrial or manufacturing processes.

To extract boracic acid from tinkalzite, a given quantity of hydrochloric acid is diluted with water, and saturated while boiling with the pulverized mineral; the clear solution is decanted while hot, and upon cooling the liquid throws down the boracic acid in large quantities.—*Technologist.*

THE WATER BAROMETER.

The following account of the water barometer has been communicated by Mr. Glaisher to the *Times*:—

"On removal of the Royal Society from Somerset House to Burlington House, the

council, at my request, placed the water barometer at my disposal, which had been erected in the hall, at the foot of the staircase, by the late J. F. Daniel, Esq., D.C.L., in the year 1832.

"The directors of the Crystal Palace Company had previously agreed to receive it, and to assign some convenient place in the Palace for its erection, where its indications could be seen by everybody. Since then, in consequence of the practical difficulties, both in its removal from London to Sydenham, and then in reboiling the water in the tube and refilling it, being so great, a longer time has elapsed than I intended. The first step taken, and the most important to ensure success, was to induce opticians of sufficient skill to undertake the task both of removal and refilling, and I am glad to say that this was very obligingly and very readily undertaken by Messrs. Negretti and Zambra, of Hatton Garden. The first operation—viz., the removal of the barometer from Somerset House, was, after much difficulty, effected by them some months since, all arriving in safety at the Palace, with the exception of the breakage of about 1½ foot from the lower end of the barometer tube. Originally the tube was filled by means of a copper steam boiler set in brickwork over a fireplace immediately under the barometer itself, so that the tube could be dropped in the boiler, which has since formed its cistern.

"Upon frequent consultations with Messrs. Negretti and Zambra this plan did not seem to be the best possible, or, indeed, available at the Palace; in the first place, there was doubt as to the boiler being sufficiently strong to bear the necessary pressure, so that the water might be boiled almost throughout the tube and kept in a state of ebullition for some time, and, secondly, no fire could be allowed in the Palace. Under these circumstances, it was at last suggested by Mr. Negretti to use an auxiliary boiler outside the building. The object in view was, first to boil the water in the cistern, suffering the steam to escape by a cock for some time, and then, by closing the cock, to drive steam through the tube till it escaped in a strong jet from its upper extremity, and then to boil the water in the tube till it issued from the top. By this means all air would be removed from the sides of the tube, and expelled from the tube itself. When this operation had continued long enough, to temporarily seal the top while the water was still flowing out, and ultimately, by means of a judicious use of the blowpipe, to hermetically seal the top of the tube. During Monday, Tuesday, and Wednesday, August 26, 27, and 28, Mr. Negretti was engaged at the Palace preparing everything, and, with great dexterity, joined a piece of glass on the broken end of the tube, of the same diameter as itself, and also joined another piece of glass on to the upper extremity, terminating in a small aperture.

"On Thursday, August 29, everything was ready for the experiment, an auxiliary boiler was planted outside the building for generating steam, a pipe from which led to the boiler under the barometer itself into which distilled water of sufficient quantity had been placed, precautions having been taken to connect the pipe from the outer boiler with that in the inner boiler, with a portion of flexible tubing which would first yield if anything went wrong. After the connexion was made, in about half an hour a current of steam issued from the cock. When this had continued for some time the cock was closed, and the steam ascended into the tube, being at first condensed by the upper part of the tube, and ultimately rushing out at the top with considerable velocity. Water then ascended into the tube; and it was an anxious moment to watch the boiling water reach and pass where the tube had been joined, which, however, had been so admirably performed that all anxiety on this head soon ceased. After a time the upper extremity, while steam was rushing out, was closed, when the water ascended the tube and soon reached a point 32 feet from the surface of water in the boiler below. After this it was driven up, by steam, to very nearly the top of the continuation of the tube, but it did not reach quite up to the sealing point. A consultation now took place, it was almost resolved to let well alone, but it was ultimately determined to go through the same process again, as some practical points had been suggested which promised to make the experiment yet more successful.

"The top of the tube was therefore opened, the water fell, and the operation was repeated. It would be tedious to detail all the steps taken in the reboiling; the operation was eminently successful, the tube was finally closed by the blowpipe,

and the column of water reached nearly 33 feet, without the slighest speck of air bubble being perceptible.

"On Friday afternoon Mr. Negretti and I found the column of water 32 feet 9 inches in length, as measured from the surface in the cistern. This is equivalent to a column of 28.84 inches of mercury, considering the specific gravity of mercury as 13.624. The reading of a mercurial barometer at the same time was 29.86 inches; the difference between these two readings is 0.98 inch, and this difference should indicate the elastic force of aqueous vapour at the temperature at the time—viz., 78 deg., if both instruments be correct. The elastic force of aqueous vapour at the temperature of 78 deg. is 0.96 inch, differing by two hundreths of an inch only from that indicated by the water barometer, and completely satisfied me as to the accuracy of the operation, thus proving that the space above the water was free from air.

"I cannot close without expressing my sense of the ready resource of Mr. Negretti in overcoming every difficulty as it arose, and of the facility with which he performed and conducted every process connected with the operation.

"My thanks are also due to Mr. Grove and Mr. Rose, of the Crystal Palace, for affording every facility. The instrument is fixed in an angle in the Tropical Department, and near the great tree. The top of the column of water can be seen from the first gallery, and as that which causes a variation of an inch of mercury will cause a variation of more than a foot in the column of water, so the changes in the latter will be more than twelve times as great as in the former. Many oscillations, therefore, may be seen by the water which cannot be seen by the mercurial barometer, and in gales of wind or heavy storms it will be highly interesting to watch its action."

CORRESPONDENCE RELATING TO THE PROGRESS OF THE SOCIETY.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—I am sorry to find that a panic seems to have seized our Society on their pecuniary circumstances, and that the ways and means are necessarily engaging an undue portion of their attention.

It is well for Societies, as for individuals, to look their difficulties in the face, and to take such steps as their reason and judgment dictate to overcome them, and to this end the first step to take is to form an accurate conception of the cause of these difficulties.

I presume that we are suffering from the fact that a large number of the young men who are being brought up to our profession do not undergo examination, and that they consequently enter into business without joining our Society, and, therefore, without contributing to our funds. Now this I take to be our weak point, and upon this we should fix our attention.

It is true we may, by the proposition of which we have heard so much, relieve ourselves from the present emergency; we may "skin and film the ulcerous place;" but, unless we can either voluntarily or compulsorily induce the alumni of our profession to join our Society we shall only stave off the evil day—but it will come. At present you have no compelling powers, and what inducement have you to offer sufficiently powerful to effect the object voluntarily?—it appears by the result none—at all events with the dull, inert, common-minded many. I recollect that in our discussions on the Pharmacy Bill after it had passed, it was assumed that the title of "Pharmaceutical Chemist" would be sufficient to bring all within our pale, and would be also sufficient to enable the public to judge of the qualification of those who were bidding for its support in the responsible position which they aspired to; but experience seems to have shown that neither of these assumptions was correct, that a large number of the candidates for pharmaceutical distinction are unwilling to have their qualifications tested by a fair examination, and that the public have been unable amongst those coming before them with *titles so similar, and all implying scientific distinction*, to discriminate between those who were worthy of their support, and those who, at all events, had not taken the trouble to have their merits vouched for by examination.

If I have indicated aright our weak point, what should be our course? I say, instead of allowing our whole attention to be absorbed by palliatives which will have no tendency to benefit the public, let us strive to obtain an Act to "amend the Pharmacy Act."

We are told in answer to this that the Legislature is indisposed to grant more restrictive powers. I disbelieve in this, if it can be shown to be for the public advantage.

The Legislature, like other bodies, is moving onwards, and is constantly sacrificing old prejudices to public improvement; finality is not a doctrine which can be maintained anywhere at the present time; and if we do not succeed at once we have but to persevere; the manifest necessities of the case will ensure our success.

Some six or seven years ago, as Chairman of a Public Board, I formed one of a deputation to confer with the minister in whose department our Board worked. Our object was to point out the imperfections of the Act which regulated our proceedings, and to inquire whether the Government were willing to bring in a Bill to give further powers.

The minister assured us that from what he knew of the temper of the House of Commons he was sure that such a measure would not have the least chance of success, and it would be useless to make the attempt.

Within a few short months the ministry went out of office, and the successor of the gentleman I have named immediately introduced a measure to accomplish the object in view, the House saw that the public interests demanded these powers, and they granted them without any difficulty.

And so, I have no doubt, it would be with the Pharmacy Act. It would not be difficult to show that that Act has not fulfilled its mission as stated by itself. Look at the preamble of the Act:—"Whereas it is expedient *for the safety of the public* that persons exercising the business or calling of Pharmaceutical Chemists shall possess a competent practical knowledge of pharmaceutical and general chemistry, and other branches of useful knowledge; and whereas it is expedient to prevent ignorant and incompetent persons from assuming the title, or pretending to be Pharmaceutical Chemists, or Pharmaceutists, in Great Britain, or Members of the said Pharmaceutical Society, and to that end *it is desirable that all persons before assuming such title should be duly examined as to their skill and knowledge by competent persons, &c.*"

Now, if all this be so, and yet the Act has not secured the desirable result—the "safety of the public"—how can the Legislature refuse to amend it? But why is it that the Pharmacy Act has failed to accomplish its purpose?

I think it is principally because the 12th section confines the examined and competent man to a single title, "Pharmaceutical Chemist;" while, in not prohibiting, it allows the unexamined to select from a number of titles, as Operative Chemist, Dispensing Chemist, &c., all *equally expressive of scientific acquirement*, and to *the public the correlatives of those assumed by the examined Members of the Society.* If the assumption of these titles, and all others *indicative of scientific knowledge*, had been confined to the examined, and had the non-examined been allowed to call themselves only by titles indicative of their being simply vendors of drugs, as Druggists, &c., then, I think, there would have been motive enough to induce the great majority of young men to fit themselves for the examination so needful for their future prospects.

I believe this alteration of the 12th section would be sufficient for our purpose.

I see some of our Members think an amendment of the Act would be forwarded by our obtaining a large accession to our numbers without examination. The whole proceeding is to me a doubtful one; but in respect to its aspect upon the point in question, I think our strong ground is that a large number hold themselves aloof because the inducements we have held out have not been sufficient to effect our purpose.

I think the alteration I have suggested would probably effect all that is desirable, and it would enable the public to discriminate between the qualified and the unqualified, and it would allow of a class useful in its way in villages and remote places, who would be enabled to supply the simple drugs which the wants of the neighbourhood might require.

Yours obediently,

Stratford-on-Avon. FREDERIC KENDALL.

TO THE EDITORS OF THE PHARMACEUTICAL JOURNAL.

GENTLEMEN,—It would be idle to reiterate the sentiments of the numerous writers whose letters have appeared in the Journal on the proposed relaxation of the Bye-laws.

I can only raise my voice with the many against a course so manifestly *unjust* and impolitic as again to throw open the doors of the Society to those who have already been offered, and *refused*, admission. If funds are required, by all means raise them in some one or more of the legitimate ways pointed out by those who have written on the subject; but raise not money by an act as insane as it is dishonest.

I am, Gentlemen, yours faithfully,

Langport, September 7th, 1861. W. WOODWARD.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—Seeing by the Journal that you are still wishing for information and opinions relative to the proposed alteration of the Bye-laws, I beg to say that out of three Chemists here, two are Members, and the third eligible for admission under the proposed alteration; but it is doubtful whether he would avail himself of the opportunity for admission.

I think it very improbable that so many would be ready to join the Society as is thought by the advocates of the alteration, and I further think that it would be derogatory to the Society, after what it has with difficulty achieved, to solicit non-members to become Members on such easy terms, after the opportunities that they formerly neglected to embrace; besides, it would be lowering the value of membership in the eyes of the public.

Yours obediently,

Henley-on-Thames, September 9th, 1861. B. EDMAN, M.P.S.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—Whatever may be the issue of the discussion raised on the progress or prospects of the Pharmaceutical Society, one thing is quite certain, we cannot continue on the present system much longer, for as the Founders and old Members pass away by an irresistible law of nature the income of the Society must diminish too. We must submit to the logic of facts, which proves that each new Member costs as much for lectures alone as he pays for entrance and examination fees. On this point you have advanced in the right direction; you now demand a fee for attendance at each course of lectures, and if the Society is to exist at all you must make the students pay their way not only for laboratory instruction, but for lectures too.

It has been suggested that the examined Members should pay an annual subscription in addition to, or in lieu of, the usual fees. I think that you tried that scheme some years ago, and as it was soon discontinued, I suppose you found that it signally failed.

Another proposition is, that Members individually should pay for the Journals or postage; that necessitates the query—what are the Journals worth? Can the science of pharmacy produce a journal worth perusal? If so, why is it month after month filled with abstruse chemical data in application to the arts or physical investigations? They are all very well in their way, and interesting to the man of science, but comparatively worthless to the Pharmaceutical Chemist.

Considering the division of labour which characterizes the application of Chemistry and Materia Medica to the preparation of chemicals, &c., and the compounding of medicine in this country, is the curriculum of education required by the Pharmaceutical Society essential to the successful conduction of the business of a Dispensing Chemist; or has the Society, by raising up a class of educated employers, who in their turn become the practical teachers of the rising body of Pharmaceutists, forestalled its office? The practical reply to this query is in the hands of the public; they must be the arbiters of our destiny, and tell us their decision through their Senate-house.

Why cannot we get a Pharmacy Bill enforcing examination on all Dispensing

Chemists? Is it because such legislation jars upon the common sense of the country?

These are a few of the questions the Council of the Pharmaceutical Society should have considered before they admitted the necessity of the huge machinery in Bloomsbury Square, and then sought to prop it up with more of the decaying element of its constitution.

I am your obedient servant,

A MAJOR ASSOCIATE.

TO THE EDITORS OF THE PHARMACEUTICAL JOURNAL.

GENTLEMEN,—If I understand the question correctly, the correspondence relating to the progress of the Society is an attempt to solve the difficult problem—how to prevent a decreasing income without derogating the position the Pharmaceutical Society has attained; and our Council find themselves much in the same position as do the directors of a railway, when from American politics or the result of some fearful accident, their onward course is checked by the announcement of a falling dividend; this is usually followed by the shareholders proposing to meet the difficulty by cutting down the working expenses, and a similar policy appears the most rational course in our present dilemma. One of your correspondents recommends that the postage of the Journals should be paid by the receivers instead of the Society, and if the Journal itself was charged to the Members and Associates a very much greater retrenchment could be effected. Should the Journal not be found self-supporting, a new series could be issued, which might be more popular among our readers, or a quarterly publication substituted in its place.

There is also an item of £51 for the Conversazione, which, although judging from the rapidity with which the ices disappeared on the last occasion, it was much in favour with those who were able to attend, yet the expense was borne by the whole of the subscribers. Would not a summer-day's excursion, paid for by the sale of tickets, and made instructive by being accompanied by our Professor of Botany, be more agreeable, without figuring so heavily in the balance-sheet?

The saving in these two items would amount to about £650 a year, and would, I trust, do away with the necessity of increasing our income by the admission of unqualified Members.

I remain, with much esteem, yours, &c.,

Wandsworth, September 17th, 1861. GEORGE NIND.

A FEE FOR CERTIFIED PRESCRIPTION COPIES.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—Much has been written lately in the Journal respecting the progress of the Society and the professional advancement of its Members. A few remarks on the system in vogue of writing copies of prescriptions *fee-less* may be appropriate to the general question. 'Tis needless to enter upon a lengthy statement, the facts being thoroughly understood by all dispensing chemists, how now and then one has to put aside other occupations, and carefully copy from the register prescriptions required for various purposes, some of which are anywise but advantageous to the copyist; hence a few conservative firms refuse copies altogether, but the majority have to yield the point, although generally under protest. From personal experience I have ever found it to be a vexable question, and recommend for consideration the practice of charging *a fee for each certified copy of prescriptions*, especially when from our respective private registers. In my opinion, no reasonable person could object to this, which, in other professions, the legal, for instance, is so commonly adopted. It would be useless, in the present unsatisfactory state of the dispensing price list, which, as I have noticed, varies for the same prescription from 1*s.* to 3*d.* per dozen for pills, 2*s.* to 8*d.* for mixtures, 2*s.* in jars to 6*d.* in "chip" for ointments, and so on,* to attempt to suggest a suitable fee, but surely one shilling might be the

* As an instance, a few days ago I dispensed an ordinary mixture (℥vj.) for 1*s.* 6*d.*; the patient went a journey through the midland district, and since his return has informed me that he was charged consecutively in different towns, 1*s.* 4*d.*, 1*s.*, and 8*d.*, the last explained by the remark, "Now, when I was in London, we charged 1*s.* 6*d.* for such a mixture as that!"

minimum. Now I hold that we cannot spare any branch of our legitimate profit, our returns are limited, and why should we decline payment for any part of our employment? If progress in professionalism be to some extent warranted by increased charges for such and such learned or artistic labour, as is the case in other professions, should not Pharmaceutical Chemists endeavour by every justifiable means to advance likewise? To do this effectually, united effort must be instituted. I shall be glad if interest in this and kindred subjects* is awakened, as well as determined action for protection of our interests, which suffer much from those not educated with us, or for the business, dividing our income. Compulsory examinations should be our motto. I am, Sirs, yours respectfully,

65, *Bury New Road, Manchester, Sept.* 6, 1861. WM. JABEZ HALLIDAY.

THE RIGHT OF CHEMISTS TO PRESCRIBE.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—In your number of the Journal for August there is a case reported of a Chemist (Huggins *v.* Jonas) who sued for medicine prescribed and supplied by himself, and was nonsuited. As this appears an innovation upon the rights and privileges secured to the Chemists by the Apothecaries' Act of 1815, allow me to inquire if this case was decided by the new Medical Registration Act of 1858, 21st and 22nd Vic., cap. 90; and if so, seeing this Act is likely to operate exceedingly prejudicial to the interests of Chemists, I should be glad to be informed if any active measures were taken by the Council of the Pharmaceutical Society to exempt the Chemists from its clauses, so far as reserving vested rights? If not, would the Council now feel disposed to exert themselves to screen the Chemists from the monopoly which has been introduced in this Act? It appears very desirable that a united effort of the trade should be made to remove such a monopoly, which is calculated greatly to inconvenience the public as well as to ruin the Chemists. I think the Pharmaceutical Society ought to take this measure up, inasmuch as it will undoubtedly affect the capability of many Chemists to support that Society who hitherto have been willing, to the best of their ability, to contribute their annual guinea.

In the Exeter County Court, the Judge said a Chemist was liable to a prosecution for prescribing: is this a fact? and by what Act of Parliament? Surely the Chemists have been napping to allow their rights and privileges thus to be taken from them without any effort at resistance. It is all very well for those unacquainted with the routine of a country business to say that prescribing is not the province of the Chemist, and that he ought to send every customer who is at all "out of sorts" to one of the medical profession; but if this were attempted to be carried out in the majority of country businesses, where the prescriptions to be dispensed in a day probably do not exceed a dozen or so, the poor Chemist would very soon have to shut up shop. The Pharmaceutical Society talks a great deal about raising the standard of the Chemist, but surely this is not the way to do it, by depriving him of the most lucrative part of his trade, and reducing him to the level of a grocer. Is it possible that those who have been supporting the Pharmaceutical Society from its commencement should have supported it for such a pass as this—to wit, to ruin our craft which has brought us much gain?

If the Pharmaceutical Society are indifferent to the welfare of their Members, and thus allow their rights to be taken from them without the slightest resistance, they must not be surprised to find them going over to the "United Trade Society," from whom they may obtain that protection from medical monopoly which they had a right to have expected from their hands.

I remain, Sir,

September 16*th*, 1861. A FOUNDATION MEMBER OF THE PHARMACEUTICAL SOCIETY.

* Another subject, viz., the Patent Medicine profit, deserves attention, which should be arranged to yield in every instance, to counterbalance loss by defunct stock, a net profit of fifty per cent. to the retailer. 1*s.* articles usually do, being priced 8*s.* or 7*s.* per dozen, but stamped 1*s.* 1½*d.* or 2*s.* 9d. medicines instead of 9*s.* and 22*s.*, are 10*s.* and 25*s.* 6*d.* per dozen, and so on in proportion.

AËROLITES.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—Your Journal for this month contains an account of the fall of an aërolite of very large dimensions, purporting to be given by the Rev. A. H. Denham. The whole story turns out to be a complete hoax. At the recent meeting of the British Association in this city, Mr. Glashier, the eminent meteorologist, stated that very frequently similar tricks have been played, and in particular instanced the case of a Chemist and Druggist in a small country town, who made a similar announcement; but who, after giving Mr. Glashier a vast amount of trouble, was obliged to confess that his story was false—given out for the purpose of notoriety, in the hope of increasing his business.

Mr. Glashier afterwards told me that he had once, in like manner, a great deal of trouble in investigating an instance in which a retired naval officer ascended to the roof of his house, whence he threw a large stone into his garden in the presence of some persons at work, pretending it was an aërolite.

Your obedient servant,

Manchester, Sept. 18th, 1861. J. T. Slugg.

SIR BENJAMIN BRODIE ON HOMŒOPATHY.*

(A LETTER TO J. S. S., ESQ.)

Dear Sir,—You desire me to give you my opinion of what is called Homœopathy. I can do so without any great labour to myself, and without making any exorbitant demand on your patience, as the question really lies in very small compass, and what I have to say on it may be expressed in very few words.

The subject may be viewed under different aspects. We may inquire, first, whether Homœopathy be, of itself, of any value, or of no value at all? secondly, in what manner does it affect general society? and thirdly, in what relation does it stand to the medical profession?

I must first request of you to observe that, whatever I may think at present, I had originally no prejudice either in favour of or against this new system; nor do I believe that the members of the medical profession generally were in the first instance influenced by any feelings of this kind. The fact is, that the fault of the profession for the most part lies in the opposite direction. They are too much inclined to adopt any new theory or any new mode of treatment that may have been proposed; the younger and more inexperienced among them especially erring in this respect, and too frequently indulging themselves in the trial of novelties, disregarding old and established remedies. For myself, I assure you that, whatever opinion I may now hold, it has not been hastily formed. I have made myself sufficiently acquainted with several works which profess to disclose the mysteries of Homœopathy, especially that of Hahnemann, the founder of the Homœopathic sect, and those of Dr. Curie and Mr. Sharpe. The result is, that, with all the pains I have been able to take, I have been unable to form any very distinct notion of the system which they profess to teach. They all, indeed, begin with laying down, as the foundation of it, the rule that "Similia similibus curantur;" or, in plain English, that one disease is to be driven out of the body by artificially creating another disease similar to it. But there the resemblance ends. Hahnemann treats the subject in one way, Dr. Curie in another, and Mr. Sharpe in another way still. General principles are asserted on the evidence of the most doubtful and scanty facts; and the reasoning on them, for the most part, is thoroughly puerile and illogical. I do not ask you to take all this for granted, but would rather refer you to the books themselves; being satisfied that any one, though he may not be versed in the science of medicine, who possesses good sense, and who has any knowledge of the caution with which all scientific investigations should be conducted, will arrive at the same conclusions as myself.

* From *Fraser's Magazine* for September, 1861.

But, subordinate to the rule to which I have just referred, there is another, which, by some of the homœopathic writers, is held to be of great importance, and which is certainly the more remarkable one of the two. The doses of medicine administered by ordinary practitioners are represented to be very much too large. It is unsafe to have recourse to them, unless reduced to an almost infinitesimal point; not only to the millionth, but sometimes even to the billionth of a grain. Now, observe what this means. Supposing one drop of liquid medicine to be equivalent to one grain, then, in order to obtain the millionth part of that dose, you must dissolve that drop in thirteen gallons of water, and administer only one drop of that solution; while, in order to obtain the billionth of a grain, you must dissolve the aforesaid drop in 217,014 hogsheads of water. Of course, it is plain that this could not practically be accomplished, except by successive dilutions; and this would be a troublesome process. Whether it be at all probable that any one ever undertook to carry it out, I leave you to judge. At any rate, I conceive that there is no reasonable person who would not regard the exhibition of medicine in so diluted a form as being equivalent to no treatment at all.

But however this may be, I may be met by the assertion, that there is undoubted evidence that a great number of persons recover from their complaints under homœopathic treatment, and I do not pretend in the least degree to deny it. In a discourse addressed by myself to the students of St. George's Hospital, in the year 1838, I find the following remarks:—"There is another inquiry which should always be made before you determine on the adoption of a particular method of treatment: what will happen in this case if no remedies whatever be employed, if the patient be left altogether to nature or the efforts of his own constitution? * * * * The animal system is not like a clock or a steam-engine, which, being broken, you must send to the clockmaker or engineer to mend it; and which cannot be repaired otherwise. The living machine, unlike the works of human invention, has the power of repairing itself; it contains within itself its own engineer, who, for the most part, requires no more than some very slight assistance at our hands." This truth admits, indeed, of a very large application. If the arts of medicine and surgery had never been invented, by far the greater number of those who suffer from bodily illness would have recovered nevertheless. An experienced and judicious medical practitioner knows this very well; and considers it to be his duty in the great majority of cases, not so much to interfere by any active treatment, as to take care that nothing should obstruct the natural process of recovery, and to watch lest, in the progress of the case, any new circumstance should arise which would make his active interference necessary. If any one were to engage in practice, giving his patients nothing but a little distilled water, and enjoining a careful diet, and a prudent mode of life otherwise, a certain number of his patients would perish from the want of further help; but more would recover; and homœopathic globules are, I doubt not, quite as good as distilled water.

But this does not account for all the success of homœopathy. In this country there is a large proportion of individuals who have plenty of money, combined with a great lack of employment; and it is astonishing to what an extent such persons contrive to imagine diseases for themselves. There is no animal machine so perfect that there may not at times be some creaking in it. Want of exercise, irregularity as to diet, a little worry of mind—these, and a thousand other causes, may occasion uneasy feelings, to which constant attention and thinking of them will give a reality which they would not have had otherwise; and such feelings will disappear as well under the use of globules as they would under any other mode of treatment, or under no treatment at all.

What I have now mentioned will go far towards explaining the success of homœopathy. But other circumstances occur every now then, from which, when they do occur, it profits to a still greater extent. *Humanum est errare.* From the operation of this universal law, medical practitioners are not exempt, any more than statesmen, divines, lawyers, engineers, or any other profession. There are cases in which there is a greater chance of too much than too little being done for the patient; and if a patient under such circumstances becomes the subject of homœopathic treatment, this being no treatment at all, he actually derives benefit from the change.

In a discourse to which I have already alluded, I thought it my duty to offer the

following caution to my pupils:—"The first question which should present itself to you in the management of a particular case is this: Is the disease one of which the patient may recover, or is it not? There are, indeed, too many cases in which the patient's condition is so manifestly hopeless, that the fact cannot be overlooked. Let me, however, caution you that you do not in any instance arrive too hastily at this conclusion. Our knowledge is not so absolute and certain as to prevent even well-informed persons being occasionally mistaken on this point. This is true, especially with respect to the affections of internal organs. Individuals have been restored to health who were supposed to be dying of disease of the lungs or mesenteric glands. * * * * It is a good rule in the practice of our art, as in the common affairs of life, for us to look on the favourable side of the question, as far as we can consistently with reason do so." I might have added, that hysterical affections are especially a source of error to not very experienced practitioners, by simulating more serious disease; seeming to resist for a time all the efforts of art, and then all at once subsiding under any kind of treatment, or, just as well, under none at all. Now, if it should so happen that a medical practitioner, from want of knowledge, or from a natural defect of judgment, makes a mistake in his diagnosis, and the patient whom he had unsuccessfully treated afterwards recovers under the care of another practitioner, it is simply said "Dr. A. was mistaken;" and it is not considered as anything very remarkable that the symptoms should subside while under the care of Dr. B. But if, on the other hand, the recovery takes place under the care of a homœopathist, or any other empiric, the circumstance excites a much larger portion of attention; and we really cannot very well wonder that, with such knowledge as they possess of these matters, the empiric should gain much credit with the public.

So far the practical result would seem to be that homœopathy can be productive of no great harm, and indeed, considering it to be no treatment at all, whenever it is a substitute for bad treatment, it must be the better of the two. But there is great harm, nevertheless. There are numerous cases in which spontaneous recovery is out of the question; in which sometimes the life or death of the patient, and at other times the comfort or discomfort of his existence for a long time to come, depends on the prompt application of active and judicious treatment. In such cases homœopathy is neither more nor less than a mischievous absurdity; and I do not hesitate to say that a very large number of persons have fallen victims to the faith which they reposed in it, and to the consequent delay in having recourse to the use of proper remedies. It is true that it very rarely happens when any symptoms show themselves which give real alarm to the patient or his friends, that they do not dismiss the homœopathist and send for a regular practitioner; but it may well be that by this time the mischief is done, the case being advanced beyond the reach of art.

That the habit of resorting to homœopathic treatment which has prevailed in some parts of society should have occasioned much dissatisfaction among the mass of medical practitioners, is no matter of wonder. It cannot be otherwise than provoking to those who have passed three or four years of the best part of their lives in endeavouring to make themselves well acquainted with disease in the wards of an hospital, to find that there are some among their patients who resort to them for advice only when their complaints have assumed a more painful or dangerous character, while they are set aside in ordinary cases, which involve a smaller amount of anxiety and responsibility, in favour of some homœopathic doctor, who very probably never studied disease at all. But it cannot be helped. In all times there have been pretenders, who have persuaded a certain part of the public that they have some peculiar knowledge of a royal road to cure, which those of the regular craft have not. It is homœopathy now; it was something else formerly; and if homœopathy were to be extinguished, there would be something else in its place. The medical profession must be contented to let the thing take its course; and they will best consult their own dignity and the good of the public, by saying as little as possible about it. The discussions as to the evils of homœopathy which have sometimes taken place at public meetings have quite an opposite effect to that which they were intended to produce. They have led some to believe that homœopathists are rather a persecuted race, and have given to the system which they pursue an im-

portance which it would never have had otherwise; just as any absurd or fanatical sect in religion would gain proselytes if it could only make others believe that it was an object of jealousy and persecution. After all, the harm done to the regular profession is not so great as many suppose it to be; a very large proportion of the complaints about which homœopathists are consulted being really no complaints at all, for which a respectable practitioner would scarcely think it right to prescribe.

There was a time when many of the medical profession held the opinion that not only homœopathy, but all other kinds of quackery, ought to be put down by the strong hand of the law. I imagine that there are very few who hold that opinion now. The fact is, that the thing is impossible; and even if it were possible, as it is plain that the profession cannot do all that is wanted of them, by curing all kinds of disease, and making men immortal—such an interference with the liberty of individuals to consult whom they please, would be absurd and wrong. As it now is, the law forbids the employment in any public institution of any one who is not registered as being a qualified medical practitioner, after a due examination by some of the constituted authorities; and it can go no further. The only effectual opposition which the medical profession can offer to homœopathy, is by individually taking all possible pains to avoid on their own part those errors of diagnosis by means of which, more than anything else, the professors of homœopathy thrive and flourish; by continuing in all ways to act honourably by the public; at the same time, never being induced, either by good nature or any motives of self-interest, to appear to give their sanction to a system which they know to have no foundation in reality. To join with homœopathists in attendance on cases of either medical or surgical disease would be neither wise nor honest. The object of a medical consultation is the good of the patient; and we cannot suppose that any such result can arise from the interchange of opinions where the views entertained or professed to be entertained by one of the parties as to the nature and treatment of disease are wholly unintelligible to the other. I am, dear Sir, yours, &c.

B. C. Brodie.

BRITISH ASSOCIATION.

The thirty-first Congress of the British Association for the Advancement of Science was opened at Manchester, on Wednesday, September 4th.

The gathering has been far larger than that at Oxford; even the Free Trade Hall proved too limited in space for the crowd anxious to hear the inaugural address. In the morning a Meeting of the General Committee was held in the Town Hall for the purpose of receiving the Report of the Council.

After the Mayor's dinner, the General Meeting was held in the Free Trade Hall, when Lord Wrottesley resigned the presidency to his successor, Mr. Fairbairn, who then delivered

THE PRESIDENT'S ADDRESS.

Gentlemen of the British Association,—Ever since my election to the high office I now occupy I have been deeply sensible of my own unfitness for a post of so much distinction and responsibility; and when I call to mind the illustrious men who have preceded me in this chair, and see around me so many persons much better qualified for the office than myself, I feel the novelty of my position and unfeigned embarrassment in addressing you. I should, however, very imperfectly discharge the duties which devolve upon me, as the successor of the distinguished nobleman who presided over the meetings of last year, if I neglected to thank you for the honourable position in which you have placed me, and to express at the outset my gratitude to those valued friends with whom I have been united for many years in the labours of the Sections of this Association, and from whom I have invariably received every mark of esteem.

A careful perusal of the history of this Association will demonstrate that it was the first, and for a long time the only institution which brought together for a common object the learned Professors of our Universities and the workers in practical science. These periodical *réunions* have been of incalculable benefit in giving to practice that soundness of principle and certainty of progressive improvement which can only be

obtained by the aceurate study of seience and its applieation to the arts. On the other hand, the men of actual practice have reciprocated the benefits thus received from theory, in testing by actual experiment deduetions whieh were doubtful, and rectifying those which were erroneous. Guided by an extended experience, and exercising a sound and disciplined judgment, they have often correeted theories apparently accurate, but nevertheless founded on incomplete data or on false assumptions inadvertently introdueed. If the British Assoeiation had effeeted nothing more than the removal of the anomalous separation of theory and practice, it would have gained imperishable renown in the benefit thus eonferred. Were I to enlarge on the relation of the achievements of science to the comforts and enjoyments of man, I should have to refer to the present epoch as one of the most important in the history of the world. At no former period did science eontribute so much to the uses of life and the wants of soeiety. And in doing this it has only been fulfilling that mission which Bacon, the great father of modern scienee, appointed for it, when he wrote that "the legitimate goal of the scienees is the endowment of human life with new inventions and riehes," and when he sought for a natural philosophy which, not spending its energy on barren disquisitions, "should be operative for the benefit and endowment of mankind." Looking, then, to the fact that, while in our time all the seienees have yielded this fruit, engineering science, with which I have been most intimately connected, has pre-eminently advaneed the power, the wealth, and the comforts of mankind, I shall probably best discharge the duties of the office I have the honour to fill by stating, as briefly as possible, the more reeent seientific discoveries which have so influenced the relations of social life. I shall, therefore, not dwell so mueh on the progress of abstract science, important as that is, but shall rather endeavour briefly to examine the applieation of science to the useful arts, and the results which have followed, and are likely to follow, in the improvement of the condition of soeiety.

The history of man throughout the gradations and changes which he undergoes in advancing from a primitive barbarism to a state of civilization shows that he has been chiefly stimulated to the cultivation of science and the development of his inventive powers by the urgent neecssity of providing for his wants and seeuring his safety. There is no nation, however barbarous, which does not inherit the germs of civilization, and there is seareely any which has not done something towards applying the rudiments of seienee to the purposes of daily life. Among the South Sea Islanders, when discovered by Cook, the Applied Sciences,—if I may use the term,—were not entirely unknown. They had observed something of the motions of the heavenly bodies, and watehed with interest their revolutions, in order to apply this knowledge to the division of time. They were not entirely deficient in the eonstruction of instruments of husbandry, of war, and of musie. They had made themselves acquainted with the rudiments of ship-building and navigation in the eonstruction and management of their canoes. Cut off from the influencc of European civilization, and deprived of intercourse with higher grades of mind, we still find the inherent prineiple of progression exhibiting itself, and the inventive and reasoning powers developed in the attempt to seeure the means of subsistence. Again, if we compare man as he exists in small communities with his condition where large numbers are congregated together, we find that densely-populated countries are the most prolific in inventions, and advanee most rapidly in seience. Beeause the wants of the many are greater than those of the few, there is a more vigorous struggle against the natural limitations of supply, a more eareful husbanding of resourees, and there are more minds at work. This fact is strikingly exemplified in the history of Mexico and Peru; and its attestation is found in the numerous monuments of the past which are seen in Central Ameriea, where the remains of cities and temples, and vast public works, erected by a people endowed with high intellectual acquirements, ean still be traced. There have been diseovered a system of canals for irrigation; long mining galleries eut in the solid roek in seareh of lead, tin and copper; pyramids not unlike those of Egypt; earthenware vases and cups, and manuscripts containing the records of their history; all testifying to so high a degree of scientific eulture and practical skill that, looking at the cruelties which attended the conquests of Cortes and Pizarro, we may well hesitate as to which had the stronger elaims on our sympathy, the vietors or the vanquished.

In attempting to notice those branches of science with which I am but imperfectly acquainted, I shall have to claim your indulgence. This Association, as you are aware, does not confine its discussions and investigations to any particular science; and one great advantage of this is, that it leads to the division of labour, while the attention each department receives, and the harmony with which the plan has hitherto worked, afford the best guarantee of its wisdom and proof of its success. In the early history of Astronomy, how vague and unsatisfactory were the wild theories and conjectures which supplied the place of demonstrated physical truths and carefully observed laws! How immeasurably small, what a very speck, does man appear, with all the wonders of his invention, when contrasted with the mighty works of the Creator; and how imperfect is our apprehension, even in the highest flights of poetic imagination, at the boundless depths of space! These reflections naturally suggest themselves in the contemplation of the works of an Almighty Power, and impress the mind with a referential awe of the great Author of our existence. The great revolution which laid the foundation of modern astronomy, and which, indeed, marks the birth of modern physical science, is chiefly due to three or four distinguished philosophers. Tycho Brahe, by his system of accurate measurement of the positions of the heavenly bodies; Copernicus, by his history of the solar system; Galileo, by the application of the telescope; and Kepler, by the discovery of the laws of the planetary motions, all assisted in advancing, by prodigious strides, towards a true knowledge of the constitution of the universe. It remained for Newton to introduce, at a later period, the idea of an attraction varying directly as the mass, and inversely as the square of the distance, and thus to reduce celestial phenomena to the greatest simplicity, by comprehending them under a single law. Without tracing the details of the history of this science, we may notice that in more recent times astronomical discoveries have been closely connected with high mechanical skill in the construction of instruments of precision. The telescope has enormously increased the catalogue of the fixed stars, or those "landmarks of the universe," as Sir John Herschel terms them, "which never deceive the astronomer, navigator, or surveyor." The number of known planets and asteroids has also been greatly enlarged. The discovery of Uranus resulted immediately from the perfection attained by Sir William Herschel in the construction of his telescope. More recently, the structure of the nebulæ has been unfolded, through the application to their study of the colossal telescope of Lord Rosse. In all these directions much has been done both by our present distinguished Astronomer Royal and also by amateur observers in private observatories, all of whom, with Mr. Lassels at their head, are making rapid advances in this department of physical science. Our knowledge of the physical constitution of the central body of our system seems likely, at the present time, to be much increased. The spots on the sun's disc were noticed by Galileo and his contemporaries, and enabled them to ascertain the time of its rotation and the inclination of its axis. They also correctly inferred, from their appearance, the existence of a luminous envelope, in which funnel-shaped depressions revealed a solid and dark nucleus. Just a century ago, Alexander Wilson indicated the presence of a second and less luminous envelope beneath the outer stratum; and his discovery was confirmed by Sir William Herschel, who was led to assume the presence of a double stratum of clouds, the upper intensely luminous, the lower grey, and forming the penumbra of the spots. Observations during eclipses have rendered probable the supposition that a third and outermost stratum of imperfect transparency encloses concentrically the other envelopes. Still more recently, the remarkable discoveries of Kirchoff and Bunsen require us to believe that a solid or liquid photosphere is seen through an atmosphere containing iron, sodium, lithium, and other metals in a vaporous condition. We must still wait for the application of more perfect instruments, and especially for the careful registering of the appearances of the sun by the photoheliograph of Sir John Herschel, so ably employed by Mr. Warren De La Rue, Mr. Welsh, and others, before we can expect a solution of all the problems thus suggested. Guided by the same principles which have been so successful in astronomy, its sister science, Magnetism, emerging from its infancy, has of late advanced rapidly in that stage of development which is marked by assiduous and systematic observation of the phenomena, by careful analysis and presentation of the facts which they disclose, and by the grouping of these in generali-

zation, which, when the basis on which they rest shall be more extended, will prepare the way for the conception of a general physical theory, in which all the phenomena shall be comprehended, while each shall receive its separate and satisfactory explanation. It is unnecessary to remind you of the deep interest which the British Association has at all times taken in the advancement of this branch of natural knowledge, or of the specific recommendations which, made in conjunction with the Royal Society, have been productive of such various and important results. To refer but to a single instance: we have seen those magnetic disturbances, so mysterious in their origin and so extensive in simultaneous prevalence,—and which, less than twenty years ago, were designated by a term specially denoting that their laws were wholly unknown,—traced to laws of periodical recurrence, revealing, without a doubt, their origin in the central body of our system, by inequalities which have for their respective periods the solar day, the solar year, and still more remarkably, and until lately unsuspected, solar cycle of about ten of our terrestrial years, to whose existence they bear testimony in conjunction with the solar spots; but whose nature and causes are in all other respects still wrapped in entire obscurity. We owe to General Sabine, especially, the recognition and study of these and other solar magnetic influences, and of the magnetic influence of the moon similarly attested by concurrent determinations in many parts of the globe, which are now held to constitute a distinct branch of this science, not inappropriately named "celestial," as distinguished from purely terrestrial magnetism.

We ought not in this town to forget that the very rapid advance which has been made in our time in Chemistry is due to the law of equivalents, or Atomic Theory, first discovered by our townsman, John Dalton. Since the development of this law, its progress has been unimpeded, and it has had a most direct bearing on the comforts and enjoyments of life. A knowledge of the constituents of food has led to important deductions as to the relative nutritive value and commercial importance of different materials. Water has been studied in reference to the deleterious impurities with which it is so apt to be contaminated in its distribution to the inhabitants of large towns. The power of analysis, which enables us to detect adulterations, has been invaluable to the public health, and would be much more so if it were possible to obviate the difficulties which have prevented the operation of recent legislation on this subject. We have another proof of the utility of this science in its application to medicine; and the estimation in which it is held by the medical profession is the true index of its value in the diagnosis and treatment of disease. The largest developments of chemistry, however, have been in connexion with the useful arts. What would now be the condition of calico-printing, bleaching, dyeing, and even agriculture itself, if they had been deprived of the aid of theoretic chemistry? For example, aniline—first discovered in coal-tar by Dr. Hofmann, who has so admirably developed its properties—is now most extensively used as the basis of red, blue, violet, and green dyes. This important discovery will probably in a few years render this country independent of the world for dye stuffs; and it is more than probable that England, instead of drawing her dye stuffs from foreign countries, may herself become the centre from which all the world will be supplied. It is an interesting fact that at the same time, in another branch of this science, M. Tournet has lately demonstrated that the colours of gems, such as the emerald, aqua-marina, amethyst, smoked rock-crystal, and others, are due to volatile hydrocarbons, first noticed by Sir David Brewster in clouded topaz, and that they are not derived from metallic oxide, as has been hitherto believed. Another remarkable advance has recently been made by Bunsen and Kirchoff in the application of the coloured rays of the prism to analytical research. We may consider their discoveries as the commencement of a new era in analytical chemistry, from the extraordinary facilities they afford in the qualitative detection of the minutest traces of elementary bodies. The value of this method has been proved by the discovery of the new metals, cæsium and rubidium, by M. Bunsen; and it has yielded another remarkable result in demonstrating the existence of iron and six other known metals in the sun. In noticing the more recent discoveries in this important science I must not pass over in silence the valuable light which chemistry has thrown upon the composition of iron and steel. Although Despretz demonstrated many years ago that iron would combine with nitrogen, yet it was not until 1857 that Mr. C. Binks proved that

nitrogen is an essential element of steel; and more recently M. Carou and M. Frémy have further elucidated this subject; the former showing that cyanogen, or cyanide of ammonium, is the essential element which converts wrought iron into steel; the latter combining iron with nitrogen through the medium of ammonia, and then converting it into steel by bringing it at the proper temperature into contact with common coal gas. There is little doubt that in a few years these discoveries will enable Sheffield manufacturers to replace their present uncertain, cumbrous, and expensive process by a method at once simple and inexpensive, and so completely under control as to admit of any required degree of conversion being obtained with absolute certainty. Mr. Crace Calvert, also, has proved that cast iron contains nitrogen, and has shown that it is a definite compound of carbon and iron, mixed with various proportions of metallic iron, according to its nature. Before leaving chemical science, I must refer to the interesting discovery by M. Deville, by which he succeeded in rapidly melting 38 or 40 pounds of platinum—a metal till then considered almost infusible. This discovery will render the extraction of platinum from the ore more perfect, and, by reducing its cost, will greatly facilitate its application to the arts.

It is little more than half a century since Geology assumed the distinctive character of a science. Taking into consideration the aspects of nature in different epochs of the history of the earth, it has been found that the study of the changes at present going on in the world around us enables us to understand the past revolutions of the globe, and the conditions and circumstances under which strata have been formed and organic remains embedded and preserved. The geologist has increasingly tended to believe that the changes which have taken place on the face of the globe, from the earliest times to the present, are the result of agencies still at work. But while it is his high office to record the distribution of life in past ages, and the evidence of physical changes in the arrangement of land and water, his results hitherto have indicated no traces of its beginning, nor have they afforded evidence of the time of its future duration. Geology has been indebted for this progress very largely to the investigations of Sedgwick and the writings of Sir Charles Lyell. As an example of the application of Geology to the practical uses of life, I may cite the discovery of the gold-fields of Australia, which might long have remained hidden but for the researches of Sir Roderick Murchison in the Ural Mountains on the geological position of the strata from which the Russian gold is obtained. From this investigation he was led by inductive reasoning to believe that gold would be found in similar rocks, specimens of which had been sent him from Australia. The last years of the active life of this distinguished geologist have been devoted to the re-examination of the rocks of his native highlands of Scotland. Applying to them those principles of classification which he long since established, he has demonstrated that the crystalline limestone and quartz rocks which are associated with mica, schists, &c., belong by their embedded organic remains to the Lower Silurian rocks. Descending from this well-marked horizon, he shows the existence beneath all such fossiliferous strata of vast masses of sandstone and conglomerate of Cambrian age; and, lastly, he has proved the existence of a fundamental gneiss, on which all the other rocks repose, and which, occupying the north-western Hebrides and the west coasts of Sutherland and Ross, is the oldest rock formation on the British Isles, it being unknown in England, Wales, or Ireland.

It is well known that the temperature increases as we descend through the earth's crust, from a certain point near the surface, at which the temperature is constant. In various mines, borings, and artesian wells, the temperature has been found to increase about one degree Fahrenheit for every sixty or sixty-five feet of descent. In some carefully conducted experiments during the sinking of Dukinfield Deep Mine—one of the deepest pits in this country—it was found that a mean increase of about one degree in seventy-one feet occurred. If we take the ratio thus indicated, and assume it to extend to much greater depths, we should reach at two and a half miles from the surface strata at the temperature of boiling water; and at depths of about fifty or sixty miles the temperature would be sufficient to melt, under the ordinary pressure of the atmosphere, the hardest rocks. Reasoning from these facts, it would appear that the mass of the globe, at no great depth, must be in a fluid state. But this deduction requires to be modified by other considerations, namely, the

influence of pressure on the fusing point, and the relative conductivity of the rocks which form the earth's crust. To solve these questions a series of important experiments were instituted by Mr. Hopkins, in the prosecution of which Dr. Joule and myself took part; and after a long and laborious investigation it was found that the temperature of fluidity increased about one degree Fahrenheit for every five hundred pounds of pressure in the case of spermaceti, bees'-wax, and other similar substances. However, on extending these experiments to less compressible substances, such as tin and barytes, a similar increase was not observed. But this series of experiments has been unavoidably interrupted; nor is the series on the conductivity of rocks entirely finished. Until they have been completed by Mr. Hopkins, we can only make a partial use of them in forming an opinion of the thickness of the earth's solid crust. Judging, however, alone from the greater conductivity of the igneous rocks, we may calculate that the thickness cannot possibly be less than nearly three times as great as that calculated on the usual suppositions of the conductive power of the terrestrial mass at enormous depths being no greater than that of the superficial sedimentary beds. Other modes of investigation which Mr. Hopkins has brought to bear on this question appear to lead to the conclusion that the thickness of the earth's crust is much greater even than that above stated. This would require us to assume that a part of the heat in the crust is due to superficial and external rather than central causes. This does not bear directly against the doctrine of central heat, but shows that only a part of the increase of temperature observed in mines and deep wells is due to the outward flow of that heat.

Touching those highly-interesting branches of science, Botany and Zoology, it may be considered presumptuous in me to offer any remarks. I have, however, not entirely neglected, in my earlier days, to inform myself of certain portions of natural history, which cannot but be attractive to all who delight in the wonderful beauties of natural objects. How interesting is the organization of animals and plants! how admirably adapted to their different functions and spheres of life! They want nothing, yet have nothing superfluous. Every organ is adapted perfectly to its functions; and the researches of Owen, Agassiz, Darwin, Hooker, Daubeny, Babington, and Jardine, fully illustrate the perfection of the animal and vegetable economy of nature.

Two other important branches of scientific research, Geography and Ethnology, have for some years been united, in this Association, in one Section, and that probably the most attractive and popular of them all. We are much indebted to Sir Roderick Murchison, among other members of the Association, for its continued prosperity, and the high position it has attained in public estimation. The spirit of enterprise, courage, and perseverance displayed by our travellers in all parts of the world have been powerfully stimulated and well supported by the Royal Geographical Society; and the prominence and rapid publicity given to discoveries by that body have largely promoted geographical research. In Physical Geography, the late Baron von Humboldt has been one of the largest contributors, and we are chiefly indebted to his personal researches and numerous writings for the elevated position it now holds among the sciences. To Humboldt we owe our knowledge of the physical features of Central and Southern America. To Parry, Sir James Ross, and Scoresby we are indebted for discoveries in the Arctic and Antarctic regions. Geography has also been advanced by the first voyage of Franklin down the Copper Mine River, and along the inhospitable shores of the Northern Seas, as far as Point Turnagain; as also by that ill-fated expedition in search of a North-West passage, followed by others in search of the unfortunate men who perished in their attempt to reach those ice-bound regions, so often stimulated by the untiring energy of a high-minded woman. In addition to these, the discoveries of Dr. Livingstone in Africa have opened to us a wide field of future enterprise along the banks of the Zambesi and its tributaries. To these, we may add the explorations of Capt. Burton in the same continent, and those also by Capt. Speke and Capt. Grant of a hitherto unknown region, in which it has been suggested that the White Nile has its source, flowing from one of two immense lakes, upwards of 300 miles long by 100 broad, and situated at an elevation of 4000 feet above the sea. To these remarkable discoveries I ought to add an honourable mention of the sagacious and perilous exploration of Central and Northern Australia by Mr. M'Douall Stuart.

Having glanced, however imperfectly, at some of the most important branches of science which engage the attention of Members of this Association, I would now invite attention to the Mechanical Sciences, with which I am more familiarly acquainted. They may be divided into Theoretical Mechanics and Dynamics, comprising the conditions of equilibrium and the laws of motion; and Applied Mechanics, relating to the construction of machines. I have already observed that Practice and Theory are twin sisters, and must work together to ensure a steady progress in mechanical art. Let us, then, maintain this union as the best and safest basis of national progress, and, moreover, let us recognize it as one of the distinctive aims of the annual *réunions* of this Association. During the last century, the science of Applied Mechanics has made strides which astonish us by their magnitude; but even these, it may reasonably be hoped, are but the promise of future and more wonderful enlargements. I, therefore, propose to offer a succinct history of these improvements, as an instance of the influence of scientific progress on the well-being of society. I shall take in review the three chief aids which engineering science has afforded to national progress—namely, canals, steam-navigation, and railways; each of which has promoted an incalculable extension of the industrial resources of the country. One hundred years ago, the only means for the conveyance of inland merchandise were the packhorses and waggons on the then imperfect highways. It was reserved for Brindley, Smeaton, and others, to introduce a system of canals, which opened up facilities for an interchange of commodities at a cheap rate over almost every part of the country. The impetus given to industrial operations by this new system of conveyance induced capitalists to embark in trade, in mining, and in the extension of manufactures in almost every district. These improvements continued for a series of years, until the whole country was intersected by canals, requisite to meet the demands of a greatly-extended industry. But canals, however well adapted for the transport of minerals and merchandise, were less suited for the conveyance of passengers. The speed of the canal boats seldom exceeded from $2\frac{1}{2}$ to 3 miles an hour; and, in addition to this, the projectors of canals sometimes sought to take an unfair advantage of the Act of Parliament, which fixed the tariff at so much per ton per mile, by adopting circuitous routes, under the erroneous impression that mileage was a consideration of great importance in the success of such undertakings. It is in consequence of short-sighted views and imperfect legislation that we inherit the numerous curves and distortions of our canal system. These defects in construction rendered canals almost useless for the conveyance of passengers, and led to the improvement of the common roads and the system of stage-coaches; so that before the year 1830 the chief public highways of the country had attained a remarkable smoothness and perfection; and the lightness of our carriages, and the celerity with which they were driven, still excite the admiration of those who remember them. These days of an efficiently worked system, which tasked the power and speed of the horse to the utmost, have now been succeeded by changes more wonderful than any that previously occurred in the history of the human race.

Scarcely had the canal system been fully developed when a new means of propulsion was adopted—namely, steam. I need not recount to you the enterprise, skill, and labour that have been exerted in connexion with steam-navigation. You have seen its results on every river and every sea; results we owe to the fruitful minds of Miller, Symington, Fulton, and Henry Bell, who were the pioneers in the great march of progress. Viewing the past, with a knowledge of the present and a prospect of the future, it is difficult to estimate sufficiently the benefits that have been conferred by this application of mechanical science to the purposes of navigation. Power, speed, and certainty of action have been attained on the most gigantic scale. The celerity with which a modern steamer, with a thousand tons of merchandise and some hundreds of human beings on board, cleaves the water and pursues her course far surpasses the most sanguine expectations of a quarter of a century ago, and indeed almost rivals the speed of the locomotive itself. Previous to 1812 our intercourse with foreign countries and with our colonial possessions depended entirely upon the state of the weather. It was only in favourable seasons that a passage was open, and we had often to wait days, or even a week, before Dublin could be reached from Holyhead. Now this distance of sixty-three miles is accomplished in

all weathers in little more than three hours. The passage to America used to occupy six weeks or two months; now it is accomplished in eight or nine days. The passage round the Cape to India is reduced from nearly half a year to less than a third of that time, while that country may be reached by the overland route in less than a month.

These are a few of the benefits derived from steam-navigation, and, as it is yet far from perfect, we may reasonably calculate on still greater advantages in our intercourse with distant nations. I will not here enter on the subject of the numerous improvements which have so rapidly advanced the progress of this important service. Suffice it to observe that the paddle-wheel system of propulsion has maintained its superiority over every other method yet adopted for the attainment of speed, as by it the best results are obtained with the least expenditure of power. In ships of war the screw is indispensable, on account of the security it affords to the engines and machinery, from their position in the hold below the water line, and because of the facility it offers in the use of sails, when the screw is raised from its position in the well to a recess in the stern prepared for that purpose. It is also preferable in ships which require auxiliary power in calms and adverse winds, so as to expedite the voyage and effect a considerable saving upon the freight.

The public mind had scarcely recovered itself from the changes which steam-navigation had caused, and the impulse it had given to commerce, when a new and even more gigantic power of locomotion was inaugurated. Less than a quarter of a century had elapsed since the first steam-boats floated on the waters of the Hudson and the Clyde, when the achievements thence resulting were followed by the application of the same agency to the almost superhuman flight of the locomotive and its attendant train. I well remember the competition at Rainhill in 1830, and the incredulity everywhere evinced at the proposal to run locomotives at twenty miles an hour. Neither George Stephenson himself, nor any one else, had at that time the most distant idea of the capabilities of the railway system. On the contrary, it was generally considered impossible to exceed ten or twelve miles an hour; and our present high velocities, due to high pressure steam and the tubular system of boilers, have surpassed the most sanguine expectations of engineers. The sagacity of George Stephenson at once seized upon the suggestions of Henry Booth, to employ tubular boilers: and that, united to the blast-pipe, previously known, has been the means of effecting all the wonders we now witness in a system that has done more for the development of practical science and the civilization of man than any discovery since the days of Adam.

From a consideration of the changes which have been effected in the means for the interchange of commodities, I pass on to examine the progress which has been made in their production. And, as the steam-engine has been the basis of all our modern manufacturing industry, I shall glance at the steps by which it has been perfected. Passing over the somewhat mythical fame of the Marquis of Worcester, and the labours of Savery, Beighton, and Newcomen, we come at once to discuss the state of mechanical art at the time when James Watt brought his gigantic powers to the improvement of the steam-engine. At that time the tools were of the rudest construction, nearly everything being done by hand, and, in consequence, wood was much more extensively employed than iron. Under these circumstances, Watt invented separate condensation, rendered the engine double-acting, and converted its rectilinear motion into a circular one suitable for the purposes of manufacture. But the discovery at first made little way, the public did not understand it, and a series of years elapsed before the difficulties, commercial and mechanical, which opposed its application, could be overcome. When the certainty of success had been demonstrated, Watt was harassed by infringements of his patent, and lawsuits for the maintenance of his rights. Inventors, and pretended inventors, set up claims, and entered into combination with manufacturers, miners, and others, to destroy the patent and deprive him of the just fruits of his labour and genius. Such is the selfish heartlessness of mankind in dealing with discoveries not their own, but from which they expect to derive benefit. The steam-engine, since it was introduced by Watt, has changed our habits in almost every condition of life. Things which were luxuries have become necessaries, and it has given to the poor

man in all countries in which it exists, a degree of comfort and independence and a participation in intellectual culture unknown before its introduction. It has increased our manufactures tenfold, and has lessened the barriers which time and space interpose. It ploughs the land, and winnows and grinds the corn. It spins and weaves our textile fabrics. In mining, it pumps, winds, and crushes the ores. It performs these things with powers so great and so energetic as to astonish us at their immensity, while they are at the same time perfectly docile, and completely under human control. In war it furnishes the means of aggression, as in peace it affords the bonds of conciliation, and, in fact, places within reach a power, which, properly applied, produces harmony and good will among men, and leads to the happiest results in every condition of human existence. We may, therefore, well be proud of the honour conferred on this country as the cradle of its origin, and as having fostered its development from its earliest applications to its present high state of perfection. I cannot conclude this notice of the steam-engine without observing the changes it is destined to effect in the cultivation of the soil. It is but a short time since it was thought inapplicable to agricultural purposes from its great weight and expense. But more recent experience has proved this to be a mistake, and already in most districts we find that it has been pressed into the service of the farm. The small locomotive, mounted on a frame with four wheels, travels from village to village with its attendant, the thrashing machine, performing the operations of thrashing, winnowing, and cleaning, at less than one-half the cost by the old and tedious process of hand-labour. Its application to ploughing and tillage on a large scale, is, in my opinion, still in its infancy, and I doubt not that many members of this Association will live to see the steam-plough in operation over the whole length and breadth of the land. Much has to be done before this important change can be successfully accomplished; but, with the aid of the agriculturist preparing the land so as to meet the requirements of steam machinery, we may reasonably look forward to a new era in the cultivation of the soil. The extraordinary developments of practical science in our system of textile manufacture, are, however, not entirely due to the steam-engine, although they are now in a great measure dependent on it. The machinery of these manufactures had its origin before the steam-engine had been applied, except for mining purposes; and the inventions of Arkwright, Hargreaves, and Crompton, were not conceived under the impression that steam would be their moving power. On the contrary, they depended upon water; and the cotton machinery of this district had attained considerable perfection before steam came to the aid of the manufacturer, and ultimately enabled him to increase the production to its present enormous extent.

I shall not attempt a description of the machinery of the textile manufactures, because ocular inspection will be far more acceptable. I can only refer you to a list of establishments in which you may examine their operations on a large scale, and which I earnestly recommend to your attention. I may, however, advert to a few of the improvements which have marked the progress of the manufacturing system in this country. When Arkwright patented his water-frames in 1767, the annual consumption of cotton was about 4,000,000 lbs. weight. Now it is 1,200,000,000 lbs. weight—300 times as much. Within half a century the number of spindles at work, spinning cotton alone, has increased ten-fold; while, by superior mechanism each spindle produces 50 per cent. more yarn than on the old system. Hence the importance to which the cotton trade has risen, equalling at the present time the whole revenue of the three kingdoms, or £70,000,000 sterling per annum. As late as 1820, the power-loom was not in existence; now it produces about 14,000,000 yards of cloth, or, in more familiar terms, nearly 8000 miles of cloth per diem. I give these particulars to show the immense power of production of this country, and to afford some conception of the number and quality of the machines which effect such wonderful results. Mule spinning was introduced by Crompton in 1787, with about 20 spindles to each machine. The powers of the machine were, however, rapidly increased; and now it has been so perfected that 2000 or even 3000 spindles are directed by a single person. At first the winding on, or forming the shape of the cop was performed by hand, but this has been superseded by rendering the machine automatic, so that it now performs the whole operation of drawing, stretching, and twisting the thread, and winding it on to the exact form, ready for

the reel or shuttle, as may be required. These and other improvements in carding, roving, combing, spinning, and weaving, have established in this country an entirely new system of industry ; it has given employment to greatly increased numbers, and a more intelligent class of work-people. Similarly important improvements have been applied to the machinery employed in the manufacture of silk, flax, and wool ; and we have only to watch the processes in these different departments to be convinced that they owe much to the development of the cotton manufacture. In the manufacture of worsted, the spinning jenny was not employed at Bradford until 1790, nor the power-loom until about 1825. The production of fancy or mixed goods from alpaca and mohair wool, introduced to this country in 1836, is, perhaps, the most striking example of a new creation in the art of manufacture, and is chiefly due to Mr. Titus Salt, in whose immense palace of industry at Saltaire it may be seen in the greatest perfection. In flax machinery, the late Sir Peter Fairbairn was one of the most successful inventors, and his improvements have contributed to the rapid extension of this manufacture.

I might greatly extend this description of our manufacturing industry, but I must for the present be brief, in order to point out the dependence of all these improvements on the iron and coal so widely distributed among the mineral treasures of our island. We are highly favoured in the abundance of these minerals, deposited with an unsparing hand by the great Author of Nature, under so slight a covering as to bring them within reach of the miner's art. To them we owe our present high state of perfection in the useful arts, and to their extended application we may safely attribute our national progress and wealth. So that, looking to the many blessings which we daily and hourly receive from these sources alone, we are impressed with devotional feelings of gratitude to the Almighty for the manifold bounties He has bestowed on us. Previously to the inventions of Henry Cort, the manufacture of wrought iron was of the most crude and primitive description. A hearth and a pair of bellows was all that was employed. But since the introduction of puddling, the iron-masters have increased the production to an extraordinary extent, down to the present time, when processes for the direct conversion of wrought iron on a large scale are being attempted. A consecutive series of chemical researches into the different processes, from the calcining of the ore to the production of the bar, carried on by Dr. Percy and others, has led to a revolution in the manufacture of iron, and although it is at the present moment in a state of transition, it nevertheless requires no very great discernment to perceive that steel and iron of any required tenacity will be made in the same furnace with a facility and certainty never before attained. This has been effected to some extent by improvements in puddling ; but the process of Mr. Bessemer—first made known at the meeting of this Association at Cheltenham—affords the highest promise of certainty and perfection in the operation of converting the melted pig direct into steel or iron, and is likely to lead to the most important developments in this manufacture. These improvements in the production of the material must, in their turn, stimulate its application on a larger scale, and lead to new constructions.

In iron ship-building an immense field is opening before us. Our wooden walls have to all appearance seen their last days ; and as one of the early pioneers in iron construction as applied to ship-building, I am highly gratified to witness a change of opinion that augurs well for the security of the liberties of the country. From the commencement of iron ship-building in 1830 to the present time, there could be only one opinion among those best acquainted with the subject, namely, that iron must eventually supersede timber in every form of naval construction. The large ocean steamers, the *Himalaya*, the *Persia*, and the *Great Eastern*, abundantly show what can be done with iron, and we have only to look at the new system of coating ships with armour plates, to be convinced that we can no longer build wooden vessels of war with safety to our naval superiority and the best interests of the country. I give no opinion as to the details of the reconstruction of the navy—that is reserved for another place—but I may state that I am fully persuaded that the whole of our ships of war must be rebuilt of iron and defended with iron armour calculated to resist projectiles of the heaviest description at high velocities. In the early stages of iron ship-building, I believe I was the first to show, by a long series of experiments, the superiority of wrought iron over every

other description of material in security and strength, when judiciously applied in the construction of ships of every class. Other considerations, however, affect the question of vessels of war, and although numerous experiments were made, yet none of the targets were on a scale sufficient to resist more than a 6-pounder shot. It was reserved for our scientific neighbours the French to introduce thick iron plates as a defensive armour for ships. The success which has attended the adoption of this new system of defence, affords the prospect of invulnerable ships of war, and hence the desire of the Government to remodel the navy on an entirely new principle of construction, in order that we may retain its superiority as the great bulwark of the nation. A committee has been appointed by the War-office and the Admiralty for the purpose of carrying out a scientific investigation of the subject, so as to determine, first, the best description of material to resist projectiles; secondly, the best method of fastening and applying that material to the sides of ships and land fortifications; and, lastly, the thickness necessary to resist the different descriptions of ordnance.

It is asserted, probably with truth, that whatever thickness of plates is adopted for casing ships, guns will be constructed capable of destroying them. But their destruction will even then be a work of time, and I believe, from what I have seen in recent experiments, that with proper armour it would require, not only the most powerful ordnance, but also a great concentration of fire, before fracture will ensue. If this be the case, a well-constructed iron ship, covered with sound plates of the proper thickness, firmly attached to its sides, will, for a considerable time, resist the heaviest guns which can be brought to bear against it, and be practically shot-proof. But our present means are inadequate for the production of large masses of iron, and we may trust that, with new tools and machinery, and the skill, energy, and perseverance of our manufacturers, every difficulty will be overcome, and armour plates produced which will resist the heaviest existing ordnance. The rifling of heavy ordnance, the introduction of wrought iron, and the new principle with strained hoops, have given to all countries the means of increasing enormously the destructive power of their ordnance. One of the results of this introduction of wrought iron and correct principles of manufacture, is the reduction of the weight of the new guns to about two-thirds the weight of the older cast-iron ordnance. Hence follows the facility with which guns of much greater power can be worked, while the range and precision of fire are at the same time increased. But these improvements cannot be confined to ourselves. Other nations are increasing the power and range of their artillery in a similar degree, and the energies of the nation must, therefore, be directed to maintain the superiority of our Navy in armour as well as in armament.

We have already seen a new era in the history of the construction of bridges, resulting from the use of iron; and we have only to examine those of the tubular form over the Conway and Menai Straits to be convinced of the durability, strength, and lightness of tubular constructions applied to the support of railways or common roads in spans which ten years ago were considered beyond the reach of human skill. When it is considered that stone bridges do not exceed 150 feet in span, nor cast-iron bridges 250 feet, we can estimate the progress which has been made in crossing rivers 400 or 500 feet in width, without any support at the middle of the stream. Even spans greatly in excess of this may be bridged over with safety, provided we do not exceed 1800 to 2000 feet, when the structure would be destroyed by its own weight.

It is to the exactitude and accuracy of our machine tools that our machinery of the present time owes its smoothness of motion and certainty of action. When I first entered this city the whole of the machinery was executed by hand. There were neither planing, slotting, nor shaping-machines, and, with the exception of very imperfect lathes and a few drills, the preparatory operations of construction were effected entirely by the hands of the workmen. Now everything is done by machine tools with a degree of accuracy which the unaided hand could never accomplish. The automaton, or self-acting machine tool, has within itself an almost creative power; in fact, so great are its powers of adaptation, that there is no operation of the human hand that it does not imitate. For many of these improvements the country is indebted to the genius of our townsmen, Mr. Richard Roberts and Mr.

Joseph Whitworth. The importance of these constructive machines is, moreover, strikingly exemplified in the Government works at Woolwich and at Enfield, chiefly arranged under the direction of Mr. Anderson, the present inspector of machinery, to whose skill and ingenuity the country is greatly indebted for the efficient state of those great arsenals.

Among the changes which have largely contributed to the comfort and enjoyment of life are the improvements in the sanitary condition of towns. These belong probably to the province of social rather than mechanical science; but I cannot omit to notice some of the great works that have of late years been constructed for the supply of water and for the drainage of towns. In former days 10 gallons of water to each person per day was considered an ample allowance. Now, 30 gallons is much nearer the rate of consumption. I may instance the water-works of this city and of Liverpool, each of which yield a supply of from 20 to 30 gallons of water to each inhabitant. In the former case the water is collected from the Cheshire and Derbyshire hills, and, after being conveyed in tunnels and aqueducts a distance of 10 miles to a reservoir, where it is strained and purified, it is ultimately taken a farther distance of eight miles in pipes, in a perfectly pure state, ready for distribution. The greatest undertaking of this kind, however, yet accomplished is that by which the pure waters of Loch Katrine are distributed to the city of Glasgow. This work, recently completed by Mr. Bateman, who was also the constructor of the water-works of this city, is of the most gigantic character, the water being conveyed in a covered tunnel a distance of 27 miles through an almost impassable country to the service reservoir, about eight miles from Glasgow. By this means 40 million gallons of water per day are conveyed through the hills which flank Ben Lomond, and after traversing the sides of Loch Chon and Loch Aird, are finally discharged into the Mudgdock Basin, where the water is impounded for distribution. We may reasonably look forward to an extension of similar benefits to the metropolis, by the same engineer, whose energies are now directed to an examination of the pure fountains of Wales, from whence the future supply of water to the great city is likely to be derived. A work of so gigantic a character may be looked upon as problematical, but when it is known that six or seven millions of money would be sufficient for its execution, I can see no reason why an undertaking of so much consequence to the health of London should not ultimately be accomplished.

In leaving this subject, I cannot refrain from an expression of deep regret at the loss which science has sustained through the death of one of our vice-presidents, the late Prof. Hodgkinson. For a long series of years he and I worked together in the same field of scientific research, and our labours are recorded in the *Transactions* of this and other Associations. To Mr. Hodgkinson we owe the determination of the true form of cast-iron beams, or section of greatest strength; the law of the elasticity of iron under tensile and compressive forces; and the laws of resistance of columns to compression. I look back to the days of our joint labour with unalloyed pleasure and satisfaction.

I regret to say that another of our vice-presidents, my friend, Mr. Joseph Whitworth, is unable to be present with us through serious, but I hope not dangerous, illness. To Mr. Whitworth mechanical science is indebted for some of the most accurate and delicate pieces of mechanism ever executed; and the exactitude he has introduced into every mechanical operation will long continue to be the admiration of posterity. His system of screw threads and gauges is now in general use throughout Europe. We owe to him a machine for measuring with accuracy to the millionth of an inch, employed in the production of standard gauges; and his laborious and interesting experiments on rifled ordnance have resulted in the production of a rifled small arm and gun which have never been surpassed for range and precision of fire. It is with pain that I have to refer to the cause which deprives me of his presence and support at this meeting.

A brief allusion must be made to that marvellous discovery which has given to the present generation the power to turn the spark of heaven to the uses of speech; to transmit along the slender wire for a thousand miles a current of electricity that renders intelligible words and thoughts. This wonderful discovery, so familiar to us, and so useful in our communications to every part of the globe, we owe to Wheatstone, Thomson, De la Rive, and others. In land telegraphy the chief

difficulties have been surmounted, but in submarine telegraphy much remains to be accomplished. Failures have been repeated so often as to call for a commission on the part of the Government to inquire into the causes and the best means of overcoming the difficulties which present themselves. I had the honour to serve on that commission, and I believe that from the report, and mass of evidence and experimental research accumulated, the public will derive very important information. It is well known that three conditions are essential to success in the construction of ocean telegraphs—perfect insulation, external protection, and appropriate apparatus for laying the cable safely on its ocean bed. That we are far from having succeeded in fulfilling the conditions is evident from the fact that out of 12,000 miles of submarine cable which have been laid since 1851, only 3000 miles are actually in working order; so that three-fourths may be considered as a failure and loss to the country. The insulators hitherto employed are subject to deterioration from mechanical violence, from chemical decomposition or decay, and from the absorption of water; but the last circumstance does not appear to influence seriously the durability of cables. Electrically, india-rubber possesses high advantages, and, next to it, Wray's compound and pure gutta percha far surpass the commercial gutta percha hitherto employed, but it remains to be seen whether the mechanical and commercial difficulties in the employment of these new materials can be successfully overcome. The external projecting covering is still a subject of anxious consideration. The objections to iron wire are its weight and liability to corrosion. Hemp has been substituted, but at present with no satisfactory result. All these difficulties, together with those connected with the coiling and paying out of the cable, will no doubt yield to careful experiment and the employment of proper instruments in its construction, and its final deposit on the bed of the ocean. Irrespective of inland and international telegraphy, a new system of communication has been introduced by Prof. Wheatstone, whereby intercourse can be carried on between private families, public offices, and the works of merchants and manufacturers. This application of electric currents cannot be too highly appreciated, from its great efficiency and comparatively small expense. To show to what an extent this improvement has been carried, I may state that 1000 wires in a perfect state of insulation, may be formed into a rope not exceeding half an inch in diameter.

I must not sit down without directing attention to a subject of deep importance to all classes—namely, the amount of protection inventors should receive from the laws of the country. It is the opinion of many that patent laws are injurious rather than beneficial, and that no legal protection of this kind ought to be granted: in fact, that a free trade in inventions, as in everything else, should be established. I confess I am not of that opinion. Doubtless there are abuses in the working of the patent law as it at present exists, and protection is often granted to pirates and impostors, to the detriment of real inventors. This, however, does not contravene the principle of protection, but rather calls for reform and amendment. It is asserted by those who have done the least to benefit their country by inventions, that a monopoly is injurious, and that if the patent laws are defended, it should be, not on the ground of their benefit to the inventor, but on that of their utility to the nation. I believe this to be a dangerous doctrine, and I hope it will never be acted upon. I cannot see the right of the nation to appropriate the labours of a lifetime without awarding any remuneration. The nation, in this case, receives a benefit; and assuredly the labourer is worthy of his hire. I am no friend of monopoly, but neither am I a friend of injustice; and I think that before the public are benefited by an invention, the inventor should be rewarded, either by a fourteen years' monopoly, or in some other way. Our patent laws are defective, so far as they protect pretended inventions; but they are essential to the best interests of the State in stimulating the exertions of a class of eminent men, such as Arkwright, Watt, and Crompton, whose inventions have entailed upon all countries invaluable benefits, and have done honour to the human race. To this Association is committed the task of correcting the abuses of the present system, and establishing such legal provisions as shall deal out equal justice to the inventor and the nation at large.

I must not forget that we owe very much to an entirely new and most attractive method of diffusing knowledge, admirably exemplified in the Great Exhibition of

1851, and its successors in France, Ireland, and America. Most of us remember the gems of Art which were accumulated in this city during the summer of 1857, and the wonderful results they produced on all classes of the community. The improvement of taste, and the increase of practical knowledge, which followed these Exhibitions, have been deeply felt; and hence the prospects which are now opening before us in regard to the Exhibition of the next year cannot be too highly appreciated. That Exhibition will embrace the whole circle of the sciences, and is likely to elevate the general culture of the public to a higher standard than we have ever before attained. There will be unfolded almost every known production of art, every ingenious contrivance in machinery, and the results of discoveries in science from the earliest period. The fine arts, which constituted no part of the Exhibition of 1851, and which were only partially represented at Paris and Dublin, will be illustrated by new creations from the most distinguished masters of the modern school. Looking forwards, I venture to hope for a great success and a further development of the principle advocated by this Association—the union of Science and Art.

In conclusion, my apologies are due to you for the length of this address, and I thank you sincerely for the patient attention with which you have listened to the remarks I have had the honour to lay before you. As the President of the British Association, I feel that far beyond the consideration of merely personal qualifications, my election was intended as a compliment to practical science, and to this great and influential metropolis of manufacture, where those who cultivate the theory of science may witness, on its grandest scale, its application to the industrial arts. As a citizen of Manchester, I venture to assure the Association that its intentions are appreciated; and to its members, as well as to the strangers who have been attracted here by this meeting, I offer a most cordial welcome.

The Meetings of the Sections commenced on Thursday. The following are the lists of the Committee of the Chemical Section, and of the Papers read in this Section.

President, Prof. W. A. Miller. *Vice-Presidents*, Prof. Anderson, Prof. Andrews, J. P. Gassiot, J. H. Gladstone, W. R. Grove, Dr. Schunck, Dr. Stenhouse, Prof. A. W. Williamson. *Secretaries*, G. D. Liveing, A. Vernon Harcourt. *Committee*, G. Bischof, W. Blyth, Crace Calvert, Dr. T. Clark, Dr. J. Davy, Prof. Daubeny, H. Deane, W. De la Rue, Prof. Delffs, Dr. J. B. Edwards, Dr. Eisenlohr, G. C. Foster, Dr. Francis, Dr. Gilbert, G. Gladstone, J. J. Griffin, F. C. Griffiths, C. H. B. Hambly, Rev. W. Vernon Harcourt, J. Higgin, J. P. Joule, Prof. Kekulé, J. Lee, S. Macadam, Dr. Matthiessen, J. Mercer, Dr. H. Müller, A. B. Northcote, H. D. Pochin, J. J. Pyne, Prof. H. E. Roscoe, R. Rumney, Dr. Russell, J. Sidebotham, R. A. Smith, Dr. Smith, D. Stone, J. Tennant, C. Tomlinson, Prof. Voelcker, W. S. Ward, R. Warington, H. H. Watson.

THURSDAY.

Opening Address by the President.

Report on the Manufactures of the South Lancashire District.

On the Effect of Great Pressure combined with Cold on the Six Non-condensible Gases, by Dr. Andrews.

On the Thermal Effects of Elastic Fluids, by Dr. Joule and Prof. W. Thomson.

FRIDAY.

The President exhibited some Photographs of different Spectra, and read a Paper on the subject.

On the Emission and Absorption of Rays of Light by certain Gases, by Dr. J. H. Gladstone.

On an Aluminous Mineral from the Upper Chalk, near Brighton, by Dr. J. H. and Mr. G. Gladstone.

On the Chemical Composition of some Woods employed in the Navy, by Dr. Crace Calvert.

On the Chemical Composition of Steel, by Dr. Crace Calvert.

On the Solvent Powers of Weak and Strong Solutions of Alkaline Carbonates on Uric Acid Calculi, by Dr. W. Roberts.

On certain Difficulties in the way of separating Gold from Quartz, by Dr. Smith (of Sydney).

SATURDAY.

On Atmospheric Ozone, by Dr. Moffat.

On Sulphuretted Hydrogen as a Product of Putrefaction, by Dr. Moffat.

On the Composition and Valuation of Superphosphates, by Prof. Galloway.

On Morin, and the Non-existence of Moro-tannic Acid, by Prof. Delffs.

On the Constitution of Paranaphthaline or Anthracine, and some of its Decomposition Products, by Prof. Anderson.

On Piperic and Hydro-piperic Acids, by G. C. Foster.

On a particular Decomposition of Ancient Glass, by H. Deane.

On the Composition and Properties of the Water of Loch Katrine, as supplied to Glasgow, by W. Wallace.

On the Proportion of Arsenic present in Paper-hangings, by Dr. Macadam.

On the Composition of Crystallized Apatite from Tumilla, near Alicante, by Prof. Voelcker.

MONDAY.

On the Cohesion Figures of Liquids, by C. Tomlinson.

Report on Field Experiments and Laboratory Researches on the Constituents of Manures essential to cultivated Crops, by Dr. Voelcker.

On the Composition of Crystallized Moroxite from Gumillo, near Alicante, by Dr. Voelcker.

On some Points in connexion with the Exhaustion of Soils, by Messrs. Lawes and Gilbert.

On the Proportion of Tin present in Tea-Lead. By Dr. Stevenson Macadam.

TUESDAY.

On the Construction of Gas-Burners for Chemical Use, by J. J. Griffin.

On Perchloric Acid and its Hydrates, by Prof. Roscoe.

Note on the Sulphur Compound formed by the Action of Sulphuretted Hydrogen on Formiate of Lead at a High Temperature, by W. H. Hurst.

On Vesicular Structure in Copper, by Drs. Russell and Matthiessen.

On the History of the Alkali Manufacture, by W. Gossage.

On the Evolution of Ammonia from Volcanoes, by Dr. Daubeny.

On an Apparatus for the rapid Separation and Measurement of Gases, by Drs. Williamson and Russell.

On Madder Photographs, by J. Mercer.

On a Specimen of Meteoric Iron from Mexico, by Prof. Tennant.

On Purifying Towns from Sewage by means of Dry Cloacæ, by Dr. J. H. Lloyd.

On an Economical Mode of Boiling Rags, &c., with Alkaline Ley, by Dr. Stevenson Macadam.

On the Action of Rennet on Milk, by Prof. Voelcker.

On Natural Combinations of Phosphates with Alkalies, by Prof. Voelcker.

On the Separation of Ammonia from Coal Gas, by Wm. Marriott.

THE BRITISH PHARMACOPŒIA.

By the Medical Act of 1858, the duty was imposed upon the General Medical Council of preparing and publishing a national Pharmacopœia, which was to regulate the dispensation of drugs throughout the United Kingdom, to render it uniform, and to supersede that most inconvenient, not to say dangerous, system by which there were maintained in the three divisions of the kingdom three different Pharmacopœias, comprising preparations even of the most active drugs, differing in the mode of preparation and in the strength of their ingredients. This system is now to come to an end. The new Pharmacopœia is advancing rapidly to a conclusion, and may be expected to be published next winter, or at latest in the spring of 1862. The work, which has been one of no small labour and difficulty, has occupied the attention of a committee, consisting of physicians, chemists, and pharmaceutists of eminence in the three kingdoms, for upwards of three years. The length of time occupied is easily accounted for when we recollect that a large part of the work has been necessarily carried on by correspondence—when we recollect, further, that there were many differences of opinion to be reconciled, perhaps

prejudices to be overcome, many processes to be tested, old and useless remedies to be struck out, new and useful ones to be introduced. The different sub-committees have worked vigorously and harmoniously together; and we shall be greatly disappointed if the new Pharmacopœia—the result of their joint and combined labours—be not such as not only to do credit to its authors, and to the General Medical Council, under whose auspices it will be published, but to prove a great boon to the medical profession and to the public. We understand that a conference for the final adjustment of the details of the Pharmacopœia has been sitting since Thursday, the 12th inst., in the Hall of the Royal College of Physicians of this city. The conference has been under the able presidency of Dr. Christison, who has all along acted as chairman of the Pharmacopœia Committee. The other members who have attended are—from England, Dr. F. Farre, Dr. Garrod, and Mr. Squire, member of the Pharmaceutical Society; from Ireland, Professor Apjohn, Dr. Aquila Smith, and Dr. Neligan; from Scotland, in addition to the President, Dr. Andrew Wood, Dr. Douglas Maclagan, Dr. Charles Wilson, and Mr. Robertson, member of the Pharmaceutical Society. It is expected that the conference will conclude its labours this week, and that the work will very shortly thereafter be sent to press.—*The Edinburgh Evening Courant.*

[The conference was finished on Thursday, Sept. 19th.]

LARGE DOSE OF TINCTURE OF ACONITE.

On the 10th of June last, Mrs. M——, a lady accustomed to take two teaspoonfuls of laudanum occasionally for a painful affection of the bowels, took in mistake two teaspoonfuls of tincture of aconite, which she had in a bottle of the same size and shape as the laudanum one, to apply to her face for tic douloureux.

One hour after taking it, some strange sensations she experienced led her to find out her mistake, and she immediately rushed off to me. I gave directly an emetic of sulphate of zinc, which acted well in two minutes. After its operation, on trying to rise, she exclaimed, "I have no use in my legs!" I carried her to a couch. The face had a pinched, anxious expression; the forehead wrinkled and corrugated between the eyebrows; the pupils slightly dilated; the pulse 45, feeble and intermitting; extremities cold; consciousness quite unaffected. She said she felt a burning sensation in the fauces, and a constriction at the chest; and that she had no feeling in her legs, arms, and face. The feeling of having no feeling (to use a paradox), she said, was "dreadful—worse than any pain."

Strong coffee and ammonia were given about every fifteen minutes. She remained in this condition two hours, and then the symptoms gradually subsided. In eight hours they had quite left her. I may mention that the tic was cured.

John W. Kay, M.R.C.S.—*In Lancet.*

ALLEGED POISONING BY ARSENIC.

At Coventry, three persons have been apprehended on suspicion of having murdered a married woman named Betsy Beamish. The prisoners' names are William Beamish, husband of the deceased, Emma Statham, who worked in the house, and Jane Stokes, a married woman, who was in attendance on the deceased a short time before her death. It appears that not long since the whole family, with the exception of the prisoner, were seized with vomiting after meals, and the youngest child was taken with convulsions on the following day, and died suddenly. The wife also became seriously ill and expired. The other children recovered. These circumstances led to suspicions, and the authorities ordered a *post-mortem* examination to be made of the body of the wife, and an inquiry was commenced before Mr. W. S. Poole, coroner, into the cause of her death. Dr. Goate, a local practitioner, had been called in by the prisoner to see "a woman and child with the bowel complaint," but no suspicions were raised in his mind, and he gave a certifi-

cate of death from diarrhœa. It was stated by Dr. Goate and Mr. Dresser, by whom the examination was made, that the state of the body was quite consistent with death by metallic poison, and that the contents of the stomach, as well as the viscera, had been forwarded to Dr. Wrightson, of Birmingham, for analysis.

At the adjourned inquest it was proved by one of the witnesses that the deceased became sick after partaking of tea and afterwards of arrowroot, both of which were made by one of the prisoners, Emma Statham. *John Bennet*, apprentice to Mr. Jenkins, chemist and druggist, proved selling 1½ oz. of arsenic to William Beamish, to kill rats with, on the 17th of August. *Henry Sewell* proved being with Beamish when he bought the arsenic. *Dr. Francis Wrightson* deposed to having analyzed the contents of a sealed jar which contained the stomach and viscera of the deceased. He discovered arsenic in a small quantity in the stomach, and evidence of the poison in the liver, the blood of the heart, and the transverse colon. *Joseph Pollard*, an assistant to Richard Watson, druggist, identified the prisoner as having come to the shop to buy arsenic to poison rats. Pollard said he did not keep any, and sold him instead a pennyworth of something else. He labelled the paper in which it was wrapped, "Poison." *Mr. Jenkins*, chemist in Smithford Street, proved the sale of arsenic to the prisoner, who signed his name in a book kept for the purpose.

The inquiry was adjourned, for the purpose of obtaining further evidence, and, on the reassembling of the jury, it was stated that, shortly after the death of his wife, the prisoner manifested considerable anxiety that some one should be present while he searched the pockets of his wife's dress. Jane Stokes was present, and her statement is that the prisoner took from his wife's dress pocket a purse, and with it a note on a slip of paper, purporting to have been written by the deceased, and to the effect that she had poisoned the child and then committed suicide. The note has been submitted to Mr. Joseph Nethercliff, of the British Museum, who, on comparing it with the known writing of the prisoner, is of opinion that the note in question was written by the prisoner. It was also proved that many months prior to the poisoning the prisoner had been on terms of improper intimacy with Emma Statham.

Mr. Powell, of Birmingham, and *Mr. Griffin*, of Leamington, appeared for the prisoner, and their cross-examinations were chiefly directed to show that for many years he had borne an unblemished character; that bugs infested the house, to destroy which arsenic mixed with soft soap had been used; that rats and mice abounded in the garden—arsenic also had been employed to get rid of them; and that he was in no way mixed up with the administration of the poison. Mr. Powell, who conducted the defence, made a point of the fact that, while only an infinitesimal quantity of arsenic had been found in the stomach of the deceased, the opinion of first-class analytical chemists showed that no smaller quantity than thirty-eight grains could cause death. No testimony to controvert the facts of the case as stated above was adduced.

The Coroner, in summing up the evidence, said the opinion of Mr. Taylor, one of the first analytical chemists of the day, was quite controverted by Mr. Powell, and there was no doubt but that very small quantities of arsenic, such as a grain or two, had been known to cause death. Although it was quite true that a small quantity only was found in the contents of the stomach, the poison was traced in every part of the human system under analysis; so that, while she took that particular quantity of arsenic found in the stomach, she must have absorbed more into the system, and much more must have been vomited away. In the absence of the note now stated upon oath to have been written by the prisoner, the jury might have come to the conclusion that the poison might have been put into the food in a mistake, or that there was some process by which it had got into the food which, in their inquiry, had not been proved; but after the evidence of Mr. Nethercliff they must either come to the conclusion that Betsy Beamish poisoned the child first and herself afterwards, or that that note had been placed in the pocket of this woman by some person or persons with the desire to avert suspicion from the real author or authors of the dreadful crime with which William Beamish now stood charged. The Coroner expressed his great regret that he had to censure one of the witnesses who had given his evidence in a very straightforward manner, but he felt constrained

to say that Dr. Goate had acted very wrongly in giving a certificate of death from diarrhœa. He understood that it was a common practice for the medical men of Coventry to give certificates of death when they knew nothing whatever of the cause; and in this case, if the doctor had had the moral courage to perform his duty, it was very probable that an inquiry would have taken place, and have saved the mother's life. He believed that Dr. Goate was extremely sorry for the inadvertence.

The jury then retired to consider their verdict, and after a brief absence, they returned with the following:—"That the deceased, Betsy and Emily Beamish, died from arsenic, purchased and administered by William Beamish, and they further say that Emma Statham was accessary to the fact."

The Coroner said he did not think he could receive that portion of the verdict in reference to Emma Statham. If she was accessary at all she was indictable for murder, and that question had better be left to the prosecution.

A Juryman.—We believe that Emma Statham had a direct or indirect guilty knowledge.

The jury retired to reconsider their verdict, and, on returning, the foreman read the following verdict:—"As to Betsy Beamish, we find that William Beamish is guilty of her wilful murder; as to Emily Beamish, we find him guilty of wilful murder. The jury cannot separate without expressing their sympathy for Mrs. Jane Stokes, whose name has appeared as implicated with the murder of Betsy Beamish. They think there never was any cause for suspicion against her, and that she had been most kind to the deceased."

MISCELLANEA.

On Digitaline.—M. Homolle, whose name, with that of M. Quevenne, is intimately connected with digitaline, has presented a paper to the Medical Society of the Paris Hospitals, wherein he gives an account of very interesting experiments on the value of the alkaloid just named. He wished to ascertain whether digitalis contained another principle besides digitaline which might possess the same properties. To arrive at a satisfactory solution, the author first prepared, with alcohol at 18°, an extract which differed from simple digitalis by the mere absence of chlorophyll. This extract (forty-five grains of which answer to about three drachms of powdered digitalis) was afterwards treated by alcohol at 40°, then by ether, and lastly by chloroform. Thus products were obtained classed respectively under Nos. 1, 2, 3, and 4. No. 1 is an extractive mass deprived of the greater portion of the bitter principle; No. 2, the acrid nauseous matter separated by ether; No. 3, the bitter principle highly concentrated; and No. 4, almost pure digitaline. M. Homolle experimented upon himself, and such violent vomiting and fearful head symptoms were produced by No. 2, that the author well-nigh paid his devotion to science with his life. No. 4 (digitaline) was proved to possess alone the power of lowering the pulse and increasing the quantity of urine. M. Léger, physician to the Bicêtre Hospital, who wrote an elaborate report on these experiments, tried some of the products (except No. 2, which had proved so severe) upon hospital patients, and verified the conclusions arrived at by M. Homolle, who certainly deserves every praise for his fearless and persevering efforts in the pursuit of pharmaceutical investigations.—*Lancet.*

White Gunpowder.—Mr. F. Hudson, in a communication to the *Chemical News* on "White Gunpowder,"* observes:—I have tried the process of separately grinding the materials, viz., chlorate of potash, ferrocyanide of potassium, and cane sugar, and then mixing them; also grinding them together with a little water added, and then dried at a temperature of about 150°. I find that those samples which were prepared moist and then dried are more easily exploded than those prepared by the dry process. In fact, one sample exploded in an open porcelain dish by simple friction with a spatula with which one of my assistants was crushing some of the larger pieces. Through the explosion he was laid up for several weeks, and nearly lost his eyesight. No samples prepared dry are as explosive as those prepared moist, the addition of

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* See *Pharm. Journ.*, p. 122.

water causing a more perfect mixing of the particles of its chemical constituents than can be effected by the dry grinding process. This accounts for the greater danger attending the use of white gunpowder prepared in the moist way.

A cannon loaded with the white powder goes off on the application of a few drops of sulphuric acid (equally as well as with a light applied) to its touch-hole.

This property of the gunpowder may possibly be applied to some advantage in the construction and preparation of bomb shells for long ranges. The shells would not explode (if filled with the white powder and containing a glass vessel with sulphuric acid) until they struck the object. No useless explosion of the shell could take place in the air, as is too often the case with the ordinary fusee shell.

Its expansive or explosive force is also twice that of common gunpowder. In all experiments performed with this white gunpowder care must be taken not to compress it too violently; otherwise accidents may frequently occur. A blow with a hammer upon stone with some of the powder upon it explodes all samples that I have prepared.

Kendal Green.—A plant which is known to have abounded in the neighbourhood of Kendal many years ago, though it be now nearly uprooted, called by Linnæus *Genista tinctoria*, and commonly called "Dyers' Broom," was brought in large quantities to Kendal, from the neighbouring commons and marshes, and sold to the dyers. This plant, after being dried, was boiled for the colouring matter it contained, which was a beautiful yellow. The cloth was first boiled in alum water, for the mordant, and then immersed in the yellow dye. It was then dried, and submerged in a blue liquor extracted from *woad*, which combining with the yellow, produced the solid green so much celebrated. About the year 1770, the plant above alluded to fell into disuse, being superseded by the Saxon green, considered to be a brighter colour, and obtained with less labour.—*The Annals of Kendal*, by Cornelius Nicholson.

New Formulæ for Sinapisms.—M. Grimault recommends the following formulæ:—Pure Glycerine 3½ drachms, starch 5 drachms, and volatile oil of mustard 20 drops; and M. Chevallier publishes the following formula for what he terms *Plastic Sinapisms*:—Volatile oil of mustard 20 drops, white pitch 15 drachms. Having melted the pitch, remove it from the fire, stir in the volatile oil, and spread on leather. By the addition of 10 per cent. of resinous oil, the mass can be spread on linen like ordinary adhesive plaister. For use, a piece can be cut off according to the size of the part to which the sinapism is intended to be applied. The effect is very speedy, and the proportions of the active principle may be varied.—*Journal de Chimie Méd.*, June, p. 357.—*Medical Times and Gazette.*

The Local Employment of Sulphate of Alumina and Zinc.—M. Homolle states that, during fifteen years, he has derived great advantage from the employment of a saturated solution (three parts to two of water) of sulphate of alumina (not alumina and potash, the ordinary alum), or of sulphate of alumina and zinc, formed by adding one part to ten of the oxide of zinc, mixing in a porcelain capsule. The solution may be applied to the part with a pencil or on charpie, according to the amount of effect to be produced; or it may be mixed with equal parts of glycerine, or five parts may be added to ten of almond oil and ninety of white cerate. —*Union Med.*, Nos. 15 and 17.—*Medical Times and Gazette.*

Glycerole.—When aconitine is mixed with a slight excess of acetic acid, it readily dissolves in glycerine, and in this state may be applied by friction to the surface requiring its anæsthetic action. The proportion of the alkaloid to each preparation must be regulated by the prescriber; two or three grains to the drachm of prepared lard is a maximum strength for the ointment, and from this down to one grain.—*Chemical News.*

Chlorate of Potash for Fœtid Breath.—In the majority of cases, fœtid breath arises from derangement of the stomach; and for such cases, an Italian medical journal recommends the following remedy. Three hours after each meal take a teaspoonful of a solution of 6 *grammes* of chlorate of potash in 120 *grammes* of sugared water (about a drachm and a half in four ounces); and at the same time rinse the mouth with the mixture.—*Dublin Medical Press.*

Deaths from Chloroform.—An inquest was held on Wednesday, Sept. 4th, at the Infirmary, Newcastle, before Mr. J. T. Hoyle, coroner, on the body of a man named John Cassnach, who had died in that institution while undergoing an operation. It appeared from the evidence that Cassnach was admitted into the infirmary on the 15th of August, under Mr. Annandale. He was in a weak condition, and labouring under scrofulous disease of the left knee-joint. Amputation of the limb was proposed as the only means of prolonging his life, and to that operation he consented. On Tuesday morning, he was prepared, with others, for operation; but, being in a state of great trepidation, he was ordered brandy prior to being removed to the operating theatre. On being placed on the operating table he was still labouring under considerable alarm. Mr. Bolton, the house-surgeon, in the presence of Sir John Fife, Mr. Annandale, and other gentlemen, administered chloroform, and the patient was soon under its influence, less chloroform than usual being required to produce the effect. A tourniquet was about to be applied to the limb, when a sudden change was observed in the patient. There was relaxation of the sphincters, a quiver of the lips, and he was dead. Galvanism and other measures were at once resorted to, but without avail. The heart had ceased to beat, and the breathing continued but a few seconds longer. Mr. Bolton made a *post-mortem* examination, and found the right side of the heart distended with fluid blood. Further than might be expected in a scrofulous subject, there was no evidence of disease in any of the internal organs; and Mr. Bolton attributed death to paralysis of the heart, induced by fear, debility, and chloroform combined. The verdict was in accordance with the medical testimony.

On Friday, Sept. 6th, an inquest was held at the Cumberland Infirmary, Carlisle, before Mr. Carrick, the county coroner, upon the body of a young man named Carruthers, who died in that institution on Thursday afternoon from the effects of chloroform, under the following circumstances:—The young man had been a patient in the institution for about a fortnight, and it was found necessary to perform some surgical operation upon him. It was decided, with his ready consent, that it should be performed while he was under the influence of chloroform. The chloroform was administered by the house-surgeon, Mr. Devereux, in the presence of Mr. Page, the visiting surgeon. The patient was soon in a state of unconsciousness, and the operation was about to be performed, when alarming symptoms manifested themselves. The patient ceased to breathe, and animation seemed to be suspended. Galvanism, and artificial inflation of the lungs, were in turn resorted to, but they both failed to bring the patient round. Evidence having been given by the house-surgeon and Mr. Page as to the circumstances under which the unfortunate young man died, the jury returned a verdict that he died from the effects of chloroform, and that no blame was attached to the medical officers. Although chloroform is much used in the infirmary, this is the first case in which its use has been attended with any serious results.

Dr. Mailly, of Mauritius, died lately from the effects of chloroform, which he had inhaled for the purpose of having a tooth extracted. The administration was performed by himself, and at a signal given the tooth was removed. Immediately afterwards he expired.—*Dublin Medical Press.*

OBITUARY.

PROFESSOR QUEKETT.

John Thomas Quekett, who died on Tuesday, began his career as a medical student at the London Hospital, and obtained by successful competition a Studentship in Anatomy for three years in the College of Surgeons; at the close of which, his superior attainments as an anatomist, especially in minute dissections and microscopical investigations, led to a permanent appointment in the Hunterian Museum. He was there principally occupied in extending and arranging the series of microscopical preparations; and the work on which his great reputation as a Histologist is chiefly based is the *Illustrated Catalogue* of the specimens, showing the minute structure of tissues, in the College Museum in Lincoln's Inn Fields. Mr. Quekett was appointed Professor of Histology; and on the retirement of Professor

Owen in 1856, became principal Conservator of that museum. But his health rapidly failed, and after successive severe and debilitating attacks, he expired at Pangbourne, on Tuesday, the 20th of August. Professor Quekett's published works on the Microscope and Microscopical Anatomy have a high and deserved reputation; his great experience and vast extent of information made his opinion of peculiar value, and in much request on obscure diseases and morbid alterations of structure; and the uniform readiness and urbanity with which he imparted his knowledge to all who visited for that purpose the Museum of the Surgeons' College, will make the memory of this most worthy and valuable officer gratefully cherished. Physiological science and the medical profession have sustained a great loss in this excellent and, whilst health and strength were spared him, indefatigable man. Professor Quekett was selected by the Council of the Royal Society from the candidates for Fellowship, and was elected in 1860.—*Athenæum.*

BOOKS RECEIVED.

The Tannin Process. By C. Russell. London: John W. Davies, 54, Princes Street, Leicester Square. Liverpool: H. Greenwood, 32, Castle Street.

Buffalo Medical and Surgical Journal and Reporter. No. 2. Sept., 1861.

Madras Quarterly Journal of Medical Science.

TO CORRESPONDENTS.

A. P. S. (Plymouth).—(1.) Prepare with cold distilled water. (2.) Any pale varnish would answer the purpose. (3.) Probably. (4.) Most likely a basic-tartrate of iron. (5.) In the process of distillation a light tarry matter floats on the surface, and is not always entirely removed.

F. G. B. (Southport).—We have not tried the process.

Inquisitive (Windsor).—(1.) *Quillaia Bark*, the bark of *Quillaia saponaria*, a native of South America. The properties of the bark are similar to those of *Saponaria officinalis*. We know of no formulæ for preparations from the bark. (2.) Solution of tannin in glycerine is sometimes made in the proportion of one part of the former to four of the latter.

Rogator (Chelsea).—Tablespoonfuls.

W. J.—Bowman's *Introduction to Chemistry.*

L. M. N. (Southport).—We know of no better book on the subject than the one alluded to.

J. B. J. (Uttoxeter).—*Licence for the Use of Stills or Retorts.* See page 202.

C. L. M. (Hull).—*Negative Impressions of Leaves, Ferns, &c.*—The following method has been given by Mr. Ince:—It consists in placing a leaf, fern, or other flat surface, on either a sheet of paper or a piece of white calico; and then by the aid of an ordinary comb and hard brush, sprinkling the entire surface over with a solution of Indian Ink.

E. C. (London).—The arrangements are not yet definitely settled.

W. H. (Bedford).—(1.) A personal application would be the most likely means. (2, 3, and 4.) Yes.

J. S. S. (Reading).—Dissolve the biborate of soda in about half the quantity of the water, add the oil and shake well together, then add the remainder of the water.

P. C. H.—The air would condense to 1719.34 cubic inches.

Mr. Humphreys.—The scheme for forming a botanical garden in Bloomsbury Square, however desirable, would, we fear, be found impracticable.

Amator Scientice.—The precipitate consisted of a double iodide of mercury and quinine. See *Pharm. Journ.*, vol. xviii., p. 181.

Mr. S. Ross.—Communication received.

Erratum.—At p. 150, for *Dublin Medical Press*, read *British Medical Journal.*

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. III.—No. V.—NOVEMBER 1st, 1861.

THE REPRESENTATION OF PHARMACY AT THE INTERNATIONAL EXHIBITION OF 1862.

We have already announced the appointment of a Committee for promoting the formation of a general united Exhibition of Drugs and Pharmaceutical Preparations at the Great Exhibition of next year. The Committee are now preparing for active operations, and desire at once to put themselves in communication with those who propose to contribute specimens to this united collection of substances used in medicine. The following statement has been prepared for circulation :—

At a Meeting of the Council of the Pharmaceutical Society, held on the 7th of August, 1861, a communication addressed to the Council by Professor Redwood, a member of the Committee of Advice appointed by Her Majesty's Commissioners to Class II., *Chemical and Pharmaceutical Products and Processes*, having been read,

It was resolved—

"That a Committee be appointed with power to carry out the objects contemplated in Dr. Redwood's letter in reference to the Exhibition of Drugs and Pharmaceutical Preparations in the International Exhibition of 1862."

The objects referred to are explained in the following resolutions, which were passed at the first meeting of the Committee on the 23rd of August :—

1. That it is desirable to ensure, as far as possible, at the International Exhibition of 1862, such an exhibition of substances used in medicine as shall fairly represent the existing state of Pharmacy in this country.

2. That the formation of a collection of Drugs and Pharmaceutical Preparations, contributed by different exhibitors, but arranged systematically in one large group, comprising, if possible, all the substances used in medicine in this country, would tend to fulfil the object contemplated in the foregoing resolution.

3. That it is desirable to have a separate collection, comprising all the articles described in the forthcoming British Pharmacopœia, forming a distinct group, and that there be only one specimen of each article in this group, such specimens to be approved by this Committee.

It has also been resolved as follows:—

4. That it is desirable to adopt, as far as possible, one uniform method of displaying the articles exhibited in this collection.

5. That the articles exhibited shall not be displayed in glass-cases, but merely arranged on shelves, so that they may be examined by the public under the supervision of an attendant who shall have charge of the collection.

6. That each exhibitor shall provide the bottles or other vessels in which his specimens are exhibited, that he may attach his name to his specimens or not as he desires, and that the specimens in either case shall be considered his property.

7. That exhibitors be applied to for contributions towards defraying the necessary expenses incurred in carrying out these arrangements, and that subscriptions be also received from Members of the Committee and others for the same purpose.

COMMITTEE.

The Members of the Council of the Pharmaceutical Society, the Professors of the Society, Messrs. Allchin, Barnes, Bastick, Brewer, Cracknell, Darby, Garle, D. Hanbury, Edward Horner, Robert Howard, Samuel Howard, T. Morson, jun., and R. Warington. *Treasurer*—Mr. Thomas Hyde Hills, 388, Oxford Street. *Honorary Curator*—Mr. John Garle, 2, Paddock Villas, Kilburn. *Honorary Secretary*—Mr. Elias Bremridge, 17, Bloomsbury Square.

We have reason to believe that a large number of our Members, as well as others, will desire to join in this undertaking, and early information should therefore be given to the Secretary of the wish to exhibit, and of the substances proposed to be exhibited, so that the Committee may make such arrangements as will ensure a tolerably complete collection, by pointing out from time to time the preparations which have been promised and those which still remain to be provided. It is not yet known what space at the Exhibition can be obtained for this collection, and the number of specimens of the same preparations from different exhibitors will necessarily be limited by the amount of space at the disposal of the Committee. The Council of the Pharmaceutical Society have given their permission for any specimens which exhibitors may have ready, to be deposited at their house, where they will be arranged in readiness for their being sent to the Exhibition building. The honorary Curator will superintend this part of the work, keeping a list of such specimens, and communicating with those who may be preparing to co-operate in the undertaking. It should be understood, with reference to manufactured substances, that those articles only should have the exhibitor's name attached to them which he has either produced, or to the production of which he has in some way contributed.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *4th September*, 1861,

Present—Messrs. Bird, Brady, Davenport, Edwards, Hanbury, Herring, Meggeson, Morson, Sandford, and Savage,

Mr. George Henry Gregory.....TAUNTON

was elected a **MEMBER.**

AT A MEETING OF THE COUNCIL, *2nd October*, 1861,

Present—Messrs. Brady, Davenport. Deane, Edwards, Herring, Hills, Lescher, Meggeson, Morson, Savage, Squire, Standring, and Waugh, the following were elected

MEMBERS.

KILBURN.....Edward J. Reeve
WESTON-SUPER-MARE.....George Gibbons

MAJOR EXAMINATION, *16th October*, 1861.

Benger, Frederick Baden.....Harlow
Ekin, Charles.....Maidstone
Fidel, Albert James.....Oxford
Sanders, Albert John.....Sandgate

MINOR EXAMINATION.

Barlow, John.....Birmingham
Trollope, William Thomas.....Yarmouth

REGISTERED APPRENTICES.

NAME.	RESIDING WITH.	ADDRESS.
Jackson, John Edward	Messrs. Argles & Co	Maidstone
Macmurdo, Edw. Longdon	Mr. Macmurdo	Edmonton
Spurling, William	Mr. Watts	Chatham
Walker, Walter Tracey	Mr. Hazell	Maidstone

THE JACOB BELL MEMORIAL FUND.

SUBSCRIPTIONS RECEIVED SINCE THE LAST ANNOUNCEMENT.

	£	s.	d.
"A Poor Member's Mite" (H. C.)	0	2	6
Allen, George, 7, Cowper Street, City Road	10	10	0
Baiss Brothers and Co., 102, Leadenhall Street	10	10	0
Barber, William James, Apothecaries' Hall	0	7	6
Barry, John T., Hornsey	5	5	0
Butcher, Thomas, Cheltenham	0	10	6
Elvey, Thomas, 8, Halkin Street	2	2	0
Hick, Joseph, Bradford	0	10	6
Hodges, William, Belfast	0	5	0
Newbery, Francis, and Sons, 45, St. Paul's Churchyard	2	2	0
Parker, Edward, Carlisle	0	10	0
Selleck, Edward, Apothecaries' Hall	0	5	0
Silverlock, Henry, Wardrobe Terrace	5	0	0
Smith, James Taylor, Kilmarnock	2	0	0
Steel, Henry, Sheffield	0	10	6

ERRATUM.—Page 157, Elliott, Robert, *for* 5*s*., *read* 10*s*. 6*d*.

PHARMACEUTICAL MEETING.

Wednesday, October 2d, 1861.

MR. PETER SQUIRE, PRESIDENT, IN THE CHAIR.

The following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced, and the thanks of the Society given to the respective donors thereof:

Transactions of the Odontological Society, from 1857 *to* 1860. From the Society.

Transactions of the Medical and Physical Society of Bombay for 1859. From the Society.

Annals of the Botanical Society of Canada. Part I. From the Society.

Journal of the Proceedings of the Linnean Society. From the Society.

Journal of the Society of Arts. From the Society.

Bulletin de la Société Chimique de Paris. From the Society.

Bulletin de la Société de France. From the Society.

Revista Pharmaceutica of the Pharmaceutical Association of Buenos Ayres. From the Editor.

British Journal of Dental Science. From the Editor.

The Dental Review. From the Editor.

The Technologist. From the Editor.

Répertoire de Chimie. From the Editor.

The Educational Times. From the Editor.

The American Journal of Materia Medica. Vols. I. and II. From Messrs. Morgan Brothers.

Paradisi in Sole, Paradisus Terrestris, or a Garden of all sorts of Pleasant Flowers. By John Parkinson. 1629. Presented by Mr. W. L. Bird.

Mémoire sur le Cynomorium Coccineum. By Dr. Weddell. From the Author.

A History of Infusoria. By Andrew Pritchard. From the Author.

The Causes and Treatment of Imperfect Digestion. By Dr. A. Leared. From the Author.

On the Sounds caused by the Circulation of the Blood. By Dr. A. Leared. From the Author.

On the Microscopic Characters of Crystals of Arsenious Acid. By Dr. Guy. From the Author.

Notes upon the Coco-nut Tree and its Uses. By Dr. Hugh Cleghorn. From the Author.

A Catalogue of Plants in the Public Garden, Bangalore. By Dr. Cleghorn. From the Author.

A Manual of Botany. By Prof. Bentley. From the Author.

A series of Specimens of Fruit Essences. From Messrs. Bush and Co.

A new Patent Safety Lamp. From E. C. Crawley, Esq.

An original Packet of Dr. James's Fever Powders, with the elder Newbery's Autograph. From Col. Philip Yorke.

A Specimen of Anacuhuite Wood. From Mr. Sugden Evans.

Specimens of Grains, Flax, Hemp, &c., forming a portion of the collection of the late Prof. Johnstone. From Mr. Ralph Robinson.

Specimens of Fruit and Seeds of the Calabash Nutmeg (*Monodora Myristica*). From Mr. H. Deane.

Specimens of "Safety Medicine Bottles." From Mr. W. F. Cleveland.

Castor Oil Dupper. From Messrs. Evans and Lescher.

Chinese Medicine Measures.

In reference to the donation of an original packet of Dr. James's Fever Powder, with the elder Newbery's Autograph, Mr. Morson stated that such a specimen was of great value, and should be carefully preserved, as at some future time it might be the means of proving the composition of the original Dr. James's Fever Powder.

The PRESIDENT said, that he also had an original packet of James's Fever Powder, but he thought it was not so old as the present donation. He would, however, refer to it, and if it was worthy of being presented to the Society, he should be happy to do so. Before sitting down, he directed the attention of the meeting to a bust of their late lamented President, Mr. Jacob Bell.

BUST OF THE LATE MR. JACOB BELL.

The PRESIDENT having thus called attention to the bust, which was generally regarded as a striking likeness,

Mr. HILLS rose, and begged to offer this bust of his much-to-be-lamented friend for the acceptance of the Members of the Pharmaceutical Society. He said, that it was to him a great as well as a melancholy pleasure to do so; and, considering the great interest which their late President had taken in the Society, he thought that the Members would like to possess a faithful image of one who had spent his time, energies, and money, indeed he might say his life's blood, during the last eighteen years of his existence in establishing and promoting the welfare of the Pharmaceutical Society. Mr. Hills also added, that his offer of the present bust having been so enthusiastically received, he would have it executed in marble, and he would, when it was completed, exchange it for the bust before them.

THE JACOB BELL MEMORIAL SCHOLARSHIPS.

The PRESIDENT then rose to announce the names of the successful candidates for the "Jacob Bell Memorial Scholarships." He said they were, no doubt, all aware of the nature of the conditions under which, and the value of these Scholarships, as full particulars concerning them had been already published in the Journal (see *Pharm. Journ.*, pp. 105 and 155 of the present year). On the present occasion, no candidates had offered themselves for the Senior Scholarship, but there were nine competitors for the Junior. The latter gentlemen had been examined by the Board of Examiners in the subjects of a general education, as also in Elementary Chemistry, Botany, and Materia Medica. The examination lasted two days, that of the first day being a written one, and that of the second, *viva voce*. The examiners had individually and collectively spoken in the highest terms of the answers of all the candidates; those of the first two especially being so meritorious, that in the absence of any competitor for the Senior Scholarship, two Junior Scholarships had been awarded by the Council. The Scholarships were awarded as follows:—

1. THOMAS W. H. TOLBORT, Registered Apprentice, residing with Mr. Froud, Chemist, Dorchester.

2. WILLIAM A. TILDEN, Registered Apprentice, residing with Mr. Allchin, Pharmaceutical Chemist, Barnsbury Road, Islington.

Mr. WAUGH said, that as this was the first time the Jacob Bell Memorial Scholarship had been awarded by the Council, he thought that the meeting would like to know that the successful competitors had not only passed a highly satisfactory examination before the Examining Board here, but they had come up for that purpose provided with very flattering testimonials from former teachers, not only to their diligent cultivation of the science of their profession, but also to the industrious and cheerful manner with which they had performed all the business duties devolving upon them. These testimonials, as well as their present honourable position, would, he felt, be a sufficient guarantee that they would, to the best of their ability, strive to do honour to the excellent and liberal-minded man in memory of whom these Scholarships had been founded.

DISTRIBUTION OF PRIZES.

The President said that he would now call upon the Professors of the Society to announce the names of the successful competitors for the prizes and certificates of honour which had been awarded to them by the Council at the conclusion of the last session. He had himself attended many of the lectures delivered at the Gardens, and he had much pleasure in bearing testimony to the great attention and uniform good conduct of the students generally whilst in attendance there.

Professor Bentley stated that in the absence of his colleague, Dr. Redwood, the duty devolved upon him, not only of reporting as to his own class of Materia Medica and Botany, but also that of Chemistry and Pharmacy. He felt quite sure that all would regret with him the absence of Dr. Redwood, more particularly so as it arose from severe indisposition; he was, however, requested by his colleague to say that the conduct and diligence of his class was everything that he could have desired, and that the answers of the competitors for the Medal and Certificates were very meritorious. The competitors who gained the Medal and First Certificate of Honour were very nearly equal.

With regard to his own class of Botany and Materia Medica, Professor Bentley said, that he had now, as on the thirteen previous occasions in which he had had the honour of being connected with the Society, to make a very favourable report; for the attention, diligence, and general progress of the students was most satisfactory to him, and augured well for their future success in life. He should have liked any gentleman who questioned in any degree the want of a desire for education amongst the rising generation of Pharmaceutists, to have been present at one of his lectures at the Gardens, he would then have seen more than seventy students paying such attention to the lecturer, that the falling of a pin accidentally would have been heard. As it was with such directly practical lectures, so it was also with others of a more difficult nature. He must add, that the duty of lecturing to such a body of students was to him a most gratifying one. The competition for the prizes and certificates was unexampled in his experience; no less than fourteen candidates competing for the same, and so satisfactory had been the answers, both at the written and *viva voce* examinations, that the Council had awarded honours to twelve of them. The three first in order of merit had most highly distinguished themselves, and too much praise could scarcely be given them. He found upon adding up the number of marks which these three gentlemen had respectively obtained, that they were nearly matched. He should look forward to the future career of all the successful competitors on this occasion with much interest, and he felt sure they would be such as to reflect credit upon themselves, upon their teachers, and upon the noble institution with which they were connected.

The questions and awards in

CHEMISTRY AND PHARMACY

were as follows:—

1. What are the standards or first measures referred to respectively in the English and French systems of weights and measures, from which the different denominations of weight and measure are calculated, and which are proposed to be used in case of need for reconstructing or testing the accuracy of weights and measures?
2. Describe the method of determining the specific gravity of a solid substance, insoluble in water, and which is lighter than water, explaining the object of each part of the process.
3. What are the best methods of reducing the following substances to powder, or to a state of minute division:— Nux vomica, agaric, camphor, magnesia, phosphorus?
4. What is the best method of making spermaceti into an emulsion?

5. Describe the method of using isinglass for clarifying spirituous liquors, and explain the manner in which the effect is produced.
6. What is meant by the "transmission of heat," and what solid substance transmits heat most perfectly?
7. What effect is produced upon a ray of polarized light when it is made to pass through oil of turpentine or solution of cane sugar?
8. Describe the production and the properties of protoxide of nitrogen, hydriodic acid, and light carburetted hydrogen.
9. What is the composition of cane sugar and of grape sugar in the crystalline state? To what extent is each of these soluble in water? What is the first effect produced in a solution of cane sugar when a small quantity of yeast is added to it?
10. What is meant by "homologous series" in Chemistry? Give examples of such series.
11. Describe the production and the properties of tartaric acid and racemic acid, and explain the relation existing between these acids.
12. Give a brief sketch of the principal processes by which organic bases of artificial origin are produced.

Medal	Thomas John Hasselby
Certificates of Honour	Thomas John Hasselby
"	William Grindley
"	Joseph Classon Preston
Certificates of Merit	George Maxwell
"	Albert J. Sanders
"	George Conder
"	Alfred P. Garland

The questions for the written examination in

BOTANY AND MATERIA MEDICA

were as follows:—

1. Describe generally the structure, development, origin, form, and size of Starch granules.
2. Give a general sketch in writing of the distinctive characters of the stems of Acotyledonous, Monocotyledonous, and Dicotyledonous plants.
3. What do you understand by Determinate and Indeterminate Inflorescence? Define a Spike, Amentum, Raceme, Panicle, Capitulum, Umbel, Corymb, and Cyme.
4. Define the following terms:—Rhizome, Tuber, Corm, Bulb, Labiate, Personate, Ligulate, Perianth, Monœcious, Diœcious.
5. What are the Physical and Chemical Characteristics of the rhizome of *Actæa racemosa?* Show how it may be distinguished from Black Hellebore.
6. What is the botanical source of Alexandrian Senna? From what district or districts is it obtained? Describe the leaflets of which it is composed; and mention the adulterations to which it is liable; and show how they may be detected.
7. What are the botanical and geographical sources of Scammony? Describe its characters (physical and chemical) when pure, and mention the substances commonly used to adulterate it, and the means by which such adulterations may be detected.
8. Explain the mode by which Aloes is obtained in the greatest purity. Mention the plants from which the officinal varieties of Aloes are supposed to be derived, and state briefly their chief distinctive characters.
9. Distinguish the *Galiaceæ* from the *Cinchonaceæ;* the *Compositæ* from the *Dipsacaceæ;* the *Solanaceæ* from the *Atropaceæ;* the *Amaryllidaceæ* from the *Iridaceæ;* and the *Liliaceæ* from the *Melanthaceæ.*
10. Give the essential characters of the following natural orders, and enumerate the officinal plants which they respectively contain:—*Malvaceæ*, *Ranunculaceæ*, *Leguminosæ*, *Cucurbitaceæ*, *Valerianaceæ*, *Scrophulariaceæ*, *Labiatæ*, *Oleaceæ*, *Polygonaceæ*, and *Euphorbiaceæ.*

VIVA VOCE EXAMINATION.

Besides the above questions, the following plants were submitted to the competitors, who were required to name them, to state the natural orders to which they respectively belonged, to mention their medical and economic properties, and to describe any peculiarity they might present worthy of notice :—

Aconitum Napellus—Althæa officinalis—Sinapis nigra—Sinapis alba—Hypericum maculatum—Epilobium angustifolium—Ecbalium officinarum—Coriandrum sativum —Æthusa Cynapium—Valeriana officinalis—Centranthus ruber—Knautia arvensis —Inula Helenium—Tanacetum vulgare—Carduus benedictus—Veronica species—Pentstemon species—Lysimachia Nummularia—Marrubium vulgare—Origanum vulgare—Symphytum officinale—Hyoscyamus niger—Polygonum Bistorta—Ricinus communis—Veratrum nigrum.

The medal and certificates were awarded as follows :—

Medal.....	Frank H. Lescher
Certificates of Honour...	Frank H. Lescher
"	John M. Davenport
"	Alexander Waugh
Certificates of Merit.....	Wiliam Grindley
"	Alfred P. Garland
"	Albert J. Sanders
"	Henry Saxby
"	James Spearing
"	Thomas John Hasselby
"	George Maxwell
"	Walter William Jones
"	Henry Denne

PRIZES FOR HERBARIA.

The President stated that the next business of the evening was to announce the successful competitors for the prizes offered by the Council for Herbaria of British Plants. The herbaria were now on the table, and he felt that they would all admire the industry exhibited by the respective collectors, and have evidence afforded them that the prizes had not been offered in vain. He would call upon Professer Bentley to describe their relative merits, and announce the result.

Professor Bentley said that the duty he had now to perform was a very pleasing one, for it must always be gratifying to those who felt interested in the education of the Pharmaceutical Chemist to have evidence afforded them that the good cause was progressing. Speaking of Botany, he said, that there could be no doubt but that such was the case; and he could not but urge upon all those who were now destined for Pharmaceutical Chemists the importance of its study, as one of the great foundation-stones of the professional edifice they would hereafter have to raise.

With regard to the particular business he had to perform, which had called forth the above remarks—namely, the announcement of the successful competitors for the Herbaria prizes—they could not but all see and appreciate the successful result in the present instance. He said that last year no prize had been awarded, but the Council had determined, he was glad to say, not to discontinue the prizes from one failure; and this year two competitors had entered the field. He was sorry that there had not been more candidates, but the extent and general goodness of the present collections went far to compensate for the small number of competitors.

Both collections forwarded on the present occasion were very meritorious. The first collection, that of Mr. James Browne, a Registered Apprentice, residing with Mr. West, Member of the Pharmaceutical Society, at Coventry, was in every respect admirable; whether we regarded the number of its

specimens (776), the rarities it contained, the excellence of their arrangement, or their good preservation and correct naming. Too much praise could scarcely be given to Mr. Browne for the industry, perseverance, and ability which he had exhibited in collecting, preserving, naming, and arranging this collection. He hoped that many of the young students now present would strive in future years to emulate the good example thus set them by Mr. Browne. The second collection, that of Mr. Joseph H. Richardson, a Registered Apprentice, residing with Mr. Balkwill, Member of the Pharmaceutical Society, at Plymouth, was also a very deserving one, and reflected much credit upon its collector. It contained many rare plants, and comprised altogether 341 species. The successful competitors were then announced as follows:—

James Browne, Coventry.....Silver Medal
Joseph H. Richardson, Plymouth ...Bronze Medal

Professor Bentley, added that these Medals would be presented to the successful competitors at the evening meeting of the Society in November, and he hoped that they would be able to be present to receive them in person.

Mr. Griffin exhibited and explained a new form of gas furnace.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

THE ANNUAL MEETING

Was held at the Royal Institution, on Friday Evening, the 27th September, 1861,

THE PRESIDENT, DR. EDWARDS, IN THE CHAIR.

The Chairman having briefly opened the meeting, called on the Secretary, Mr. T. D. Walker, to read the

REPORT.

In presenting their Annual Report of the proceedings of the Association, your Council have a pleasing duty to perform, and they hope that the progress of the Association during the twelfth year of its existence, and its present position, will prove equally gratifying to the Members.

The number of Members and Associates now on the roll is 186, a larger number than the Association ever before comprised, but one that might probably be still further increased by those at present belonging to it making known the advantages and privileges of the Association among their friends.

During the past year, seventeen ordinary Meetings were held, and a Conversazione. The ordinary Meetings were of the usual character, and generally well attended. The Conversazione in December last was attended by 350 ladies and gentlemen, and your Council trust that the entertainment provided was entirely satisfactory to the Members.

Your Librarian, Mr. Walker, has presented his report of the Library and its working during the year, from which it appears that 47 vols. have been added since the last report, 22 by presentation, and 25 by purchase. A greater number of Members has made use of the Library, and the circulation has increased from 766 vols. in the previous year to 988 vols. in the one just closing. The following tabular statement from the last report, with the addition of the statistics for the year 1860-1, represents the progress of the Library during the last seven years:—

	FOR THE YEAR						
	1854-5	1855-6	1856-7.	1857-8.	1858-9.	1859-60.	1860-1.
No. of Vols. in Library...	77	167	230	324	345	397	444
No. of Members using the Library	34	32	50	77	72	90	99
Circulation of Books	202	217	393	577	738	766	988
Amount of Fines.....	15*s.* 8*d.*	£1 14 0	£2 2 6	£2 6 10	£2 14 2	£3 4 2	£3 8 10
No. of Members and Associates	73	100	143	164	167	177	186

A Sub-Committee has recently inspected the Library, and presented a satisfactory report of its condition.

The microscope has been more frequently used, and the amount received for its use (notwithstanding a reduction in the charge to the extent of one half) has been greatly increased. The instrument has suffered no injury since its purchase, and is now in perfect order. Mr. H. S. Evans has presented an interesting collection of thirty mounted objects for the microscope, and it is suggested that there may be others who have it in their power to do good service to the Association by following this example.

The Laboratory class has been conducted as usual during the past session, and the progress of the pupils, as well as their regular attendance, have been satisfactory. The President's prize for the best written examination at the close of the session was awarded to Mr. H. Bird.

Your Council regret that no competition within the specified time has taken place for the prizes liberally offered by the President for the best chemical and microscopical collections, but the amount is still at the disposal of the Council, and will be again offered for competition during the ensuing session.

The donations to the Museum have been less numerous of late than in previous years; but several valuable additions are shortly expected. Amongst others may be mentioned a numerous collection of specimens illustrative of American Materia Medica and Pharmacy, from Boston, Mass., and some beautiful chemical products, recently exhibited before the British Association at its meeting in Manchester. At the same time, many deficiencies are observable, which it is in the power of the Members to supply, and your Council rely upon the individual exertions of Members in filling up vacancies, and rendering this valuable collection as complete as possible.

The Treasurer will lay before you his Annual Financial Statement, from which it will be seen that there is a balance in hand of £29 18*s.* 3*d.*

Messrs. Dutton, Evans, Mercer, and Walker retire from the Council by rotation, and the vacancies thus caused will have to be filled up at the present Meeting.

Before concluding, your Council would call the attention of Members to the arrangements made by the Pharmaceutical Society for facilitating the exhibition of Chemical and Pharmaceutical products at the Great National Exhibition of 1862. Full particulars of these arrangements will be found in the September Number of the *Pharmaceutical Journal*, and your Council hope that a number of contributions will be made by Members of this Association.

The Chairman then called upon the Treasurer, Mr. R. Sumner, to read his financial statement, from which it appeared that at the commencement of the year there was a balance in hand of £19 15*s.* 3*d.*, while the balance in hand at the present time amounted to £29 18*s.* 3*d.*

The Liverpool Chemists' Association, in account with R. Sumner, Treasurer.

Session 1860-61.

Dr.	£	s.	d.	Cr.	£	s.	d.
To Cash Paid for Address to W. Brown, Esq.	3	3	0	By Balance in hand	19	15	5
" Fire Insurance	1	10	4	" Subscriptions, 4 arrears	2	0	0
" Tea, Coffee, and Attendance	11	19	0	" " 147 Members	73	10	0
" Delivery of Circulars	8	7	1	" " 20 Associates	5	0	0
" Collector's Commission	2	3	0	" Library Fines	3	8	10
" Books	13	16	0	" Microscope Fees	1	11	0
" Stationery, &c.	1	11	4	" Proceeds Conversazione	12	3	6
" Printing	7	13	9	" Laboratory Fees	43	1	0
" Attendance at Meetings	2	5	0				
" Expenses Conversazione	22	12	9				
" Rent	10	10	0				
" Dr. Edwards's Laboratory Fees	43	1	0				
" Committee of Gallery of Science, &c.	2	0	0				
" Balance in hand	29	18	3				
	£160	9	9		£160	9	9

By balance in hand £29 18 3

Examined and found correct,

Robert Tiernan, Samuel Banner, *Auditors.*

September 27th, 1861.

The CHAIRMAN, in moving the adoption of the report and the Treasurer's statement of accounts, congratulated the meeting upon the progress which had been made by the Association, and the position occupied by it at present. He alluded to the many and great advantages offered in return for a very moderate subscription, and expressed his opinion that in no other town in England were equal facilities offered for the pursuit of chemical or pharmaceutical studies, as were placed within the reach of young men by the Liverpool Chemists' Association. He concluded by moving "That the report and statement of accounts now read be adopted and printed; and that a copy be sent to each Member of the Association."

Mr. T. R. ARNOTT seconded the motion, which was unanimously agreed to.

Mr. R. SUMNER moved—"That the best thanks of the Association be given to those gentlemen who have lectured or read papers at the meetings, and to the donors to the Library or Museum during the past year."

Mr. J. ABRAHAM seconded the motion, which was unanimously agreed to.

Mr. S. BANNER moved—"That the thanks of the Association be given to the officers and other members of the Council for their services during the year."

Mr. ROBT. THOMAS seconded the motion, which was unanimously agreed to.

The CHAIRMAN, on behalf of the Council, acknowledged the vote of thanks to that body, whose services he was sure were most cheerfully given, and who were amply repaid by such an expression of opinion on the part of the Members that those services were appreciated. The only object of the Council was to promote the welfare of the Association, and they hoped that to some extent they had succeeded in securing that object.

The meeting then proceeded to elect four Members of the Council, to fill up the vacancies caused by the retirement in rotation of Messrs. J. Dutton, H. S. Evans, N. Mercer, and T. D. Walker. The retiring Members were re-elected by large majorities.

Mr. N. MERCER moved—"That the word 'May' be substituted for June, in law 8." Mr. M. explained that the effect of the proposed alteration would be to shorten the session by two meetings, making the number of ordinary meetings sixteen instead of eighteen. The later meetings of the session extended further into the summer than those of any other scientific society in the town, and, as a consequence, the attendance was much below the earlier meetings. The Council would still have the power of calling extra meetings whenever it might be desirable.

Mr. W. WRIGHT seconded the resolution, which was supported by the Secretary, and unanimously adopted by the meeting.

The CHAIRMAN then requested that any Member having a communication to make with reference to other business, coming within the scope of the annual meeting, would lay it before the meeting.

Mr. ABRAHAM intimated that at the next annual meeting, he would move an addition to Law 6, to the effect that a copy of every proposed alteration in the Laws, of which the Secretary shall have received due notice, shall be inserted in the circular calling the annual meeting.

There being no other business, a vote of thanks to the President, for his services in the chair, closed the proceedings of the meeting.

The First Meeting of the Thirteenth Session was held on Thursday, Oct. 17th, 1861,

J. B. EDWARDS, ESQ., PH.D., IN THE CHAIR.

Dr. EDWARDS informed the meeting that the Council had done him the honour of again electing him President, and he could promise that he would discharge the duties of the office to the best of his ability. He was glad to see such a numerous meeting at the opening of the Session, and hoped their future proceedings would be characterized by the same energy and success which had distinguished their past career.

The following gentlemen were elected Members:—Messrs. A. N. Tate, James Gill, W. P. Thompson, James Stretton, H. Hutchinson, C. Wye Williams, E. R. Banner, and J. C. Ingram. Mr. E. W. Tomlinson was elected an Associate.

There was a large number of books on the table, which had been lately purchased for the Library, including Sowerby's *British Wild Flowers*, *The Micrographic Dic-*

tionary, Knight's *Cyclopædia of Arts and Sciences*, 8 vols., Fordyce's *History of Coal, Coal-fields, Coke, and Iron*, Hassall's *Adulterations Detected*, Faraday's *Researches in Chemistry and Physics*, and many other valuable works.

The Secretary (Mr. T. D. Walker) announced the following donations:—To the Library: *The Pharmaceutical Journal*, four numbers, from the Pharmaceutical Society; *The Chemist and Druggist*, four numbers, by the Editor; *The Technologist*, four numbers, from the Editor; *The New York Journal of Materia Medica*, from Messrs. Morgan Brothers; *The Buenos Ayres Revista Pharmaceutica*, two numbers, from Mr. C. Murray; *Pharmacopœia Edinburghensis*, 1722, from Dr. Imlach; *Heat in its Relation to Water and Steam*, from the Author, Charles Wye Williams, Esq.; Lankester's *Lectures on Food*, and a volume of *Discourses read before the Royal Society*, published in 1708, from Mr. N. Mercer; *History of the Soda Manufacture*, from the Author, W. Gossage, Esq.—To the Museum: Specimens of Japanese Tea, from Mr. W. Wilby; Silicate of Soda in various forms, and a handsome pillar of Silicated Soap, from Messrs. Gossage and Sons, Widnes Dock; a complete series of specimens illustrative of the Manufacture of Soda Ash and Bicarbonate of Soda, from Messrs. Hutchinson and Earle, Widnes Dock; a large East Indian Dupper, used for importing oils, from Mr. H. S. Evans.

The President then proceeded to deliver his opening Address, in the course of which he referred to the relations between force and matter, and the wonderful discoveries made of late years in physics and chemistry; illustrating his remarks by some beautiful experiments, showing the various forms in which force manifests itself on the disturbance of matter. A hearty vote of thanks was passed to the President for his interesting address, and the meeting separated.

ORIGINAL AND EXTRACTED ARTICLES.

NOTES ON CHINESE MATERIA MEDICA.

BY DANIEL HANBURY, F.L.S.

(*Continued from page* 209.)

In the account given in the last number of the *Pharmaceutical Journal* (p. 205) of the little fruits referred to *Daphnidium Cubeba* N. ab Es., I stated that I had not been able to identify the Chinese name in any work to which I had access. Since that was written, I have discovered that the name *Shing-tow-kea* is erroneous, and that the fruits in question are known to the Chinese as 畢登茄 *Peĭh-ching-kea*, a designation applied also to cubebs. Whether the Chinese use the two drugs indiscriminately, I am unable to say: the name appears to be applied properly to true cubebs, as the figure in the *Pun-tsaou* (fig. 690) with that name appended to it represents a bunch of cubebs rather than the fruit of a laurineous tree. There is, however, ground to suspect that Europeans as well as Chinese have confounded the little berries in question with real cubebs, for M. Rondot, in his *Commerce d'Exportation de la Chine*,* enumerates cubebs as a production not only of Java, but of China likewise, and mentions that Chinese cubebs are exported to India. The latter may possibly be the berries of the *Daphnidium*.

ROOTS.

鬱金 *Yŭh-kin.*—Tubers of a species of *Curcuma* (*Scitamineæ*); *Pun-tsaou*, fig. 179; Tatarinov, *Catal. Med. Sinens.*, p. 32; *Yŏ kin*, Cleyer, *Med. Simp.*, No. 65.

* Paris, 1848, p. 83.

Oblong or ovate tubers (fig. 11) tapering at either end, from $\frac{3}{4}$ to $1\frac{1}{4}$ inches in length, covered externally with a thin, adherent, brownish-grey cuticle, usually (but not invariably) smooth. When broken, they exhibit a shining fracture, and are seen to consist of a hard, semi-transparent, horny, orange-yellow substance, easily separable into two portions, an inner and an outer. The tubers have an aromatic odour, and a slight taste resembling turmeric, and contain an abundance of starch.

Fig. 11.

Many scitamineous plants produce at the extremities of the roots springing from the rhizome, starchy tubers such as those above described. Dr. Roxburgh calls them *pendulous tubers*, from their descending into the ground beneath the rhizome.* They are usually less aromatic, and more amylaceous, than the rhizome: from those of some species of *Curcuma*, the so-called East Indian Arrow-root is manufactured.

The plant producing *Yŭh-kin* is undetermined; it is a native of the south of China, and is most probably a species of *Curcuma*.

玉竹 *Yŭh-chŭh;* Rhizome of *Bambusa Arundo* Nees (*Gramineæ*); *Yĕ chŏ*, *Arundo Bambos* Lour. (non Linn.)

This drug consists of a rhizome of a pale yellowish-brown colour and somewhat translucent, in contorted pieces of some inches in length, flattened or nearly cylindrical, $\frac{2}{10}$ to $\frac{4}{10}$ of an inch in greatest diameter, marked with concentric rings at unequal distances, and dotted with the remains of radical fibres. The pieces are moist, compressible and flexible, but break readily with a short fracture. They have a sweetish, mucilaginous taste, with but little odour. When macerated in water, they regain their natural dimensions, becoming three times as thick as in the dry state. The root and young shoots of this bamboo are stated by Loureiro, in the medical language of the day, to be resolvent and attenuant, to promote diaphoresis and diuresis, to purify the blood, &c., &c.

蒼术 *Tsang-shŭh;* Rhizome of *Atractylodes* sp. (*Compositæ*); *Pun-tsaou*, fig. 102.

Portions of a rhizome from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch in diameter, occurring in oblong, jointed, occasionally branching pieces, of $1\frac{1}{2}$ to 3 inches in length. They are invested with a rough, brown cuticle, and some pieces are beset with radical fibres. The cut surface exhibits a spongy whitish substance, scattered through which, cells filled with resinous-looking matter of a deep orange colour may be seen with a lens.† *Tsang-shŭh* has a slightly aromatic odour, though but little taste. It is enumerated among the drugs of Kiang-nan and Hoo-kwang. According to MM. Hoffmann and Schultes,‡ three species of *Atractylodes*, namely *A. lancea* D. C., *A. lyrata* S. et Z., and *A ovata* D. C., are known by the Chinese name above given. Thunberg, who describes two of them under the genus *Atractylis*, does not allude to their possessing medicinal properties.

玄參 *Heuen-săng; Hiuen sen*, Cleyer, *Med. Simp.*, No. 44; *Pun-tsaou*, fig. 110; *Siuan-szen*, Tatarinov, *Cat. Med. Sinens*, p. 48.

Fleshy roots of about 4 inches in length and one inch in diameter at the

* See figures given by Rumphius, Kæmpfer, Roscoe, and others.

† This resinous-looking matter is not removed by water, alcohol, or ether.

‡ *Journal Asiatique*, Oct., Nov., 1852, p. 275.

middle, whence they taper to either extremity. They are longitudinally wrinkled and furrowed, and covered with an adherent brown cuticle; internally, they are fleshy and black; they have a sweetish taste and but little odour.

延胡索 *Yen-hoo-sŭh;* Tubers of *Corydalis ambigua* Chamisso et Schlechtendal in *Linnæa*, t. i. (1816), p. 558 (*Fumariæ*); *Pun-tsaou*, fig. 133.

Little, hard, brown tubers, of somewhat flattened spherical form, averaging half an inch in diameter. Externally, they are covered with a thin wrinkled cuticle; when broken, they exhibit a bright yellow, semi-transparent, waxy appearance.

Corydalis ambigua Cham. et Schl., from which, according to Messrs. Hoffmann and Schultes,* this drug is derived, is a plant of Siberia and Kamtschatka, throwing up its flowers upon the melting of the snow in early spring; it is also found in the Amoor country. I am indebted to Dr. E. Regel, of St. Petersburg, for an authentic specimen of the tuber of this plant, comparison of which with the Chinese drug is confirmatory of their identity.

麥門冬 *Mĭh-mun-tung;* Tubers of *Ophiopogon Japonicus* Ker (*Smilaceæ*); *Convallaria Japonica* L.; *Mondo* Kæmpf., *Amœn.*, p. 823, with fig.; *Pun-tsaou*, fig. 268; *Mĕ mûen tum*, Cleyer, *Med. Simp.*, No. 14.

This drug consists of cylindrical fleshy tubers, from 1 to 2 inches in length, and from $\frac{1}{8}$ to $\frac{1}{4}$ of an inch in diameter, tapering at either extremity (fig. 12). They are of a pale yellowish grey colour and translucent; somewhat shrivelled through drying, soft, flexible, yet easily broken. A central ligneous cord, resembling a stiff thread, runs longitudinally through each. The tubers have a slightly saccharine and aromatic taste, with a somewhat terebinthinous not unpleasant odour. Their aqueous decoction is not rendered blue by iodine.

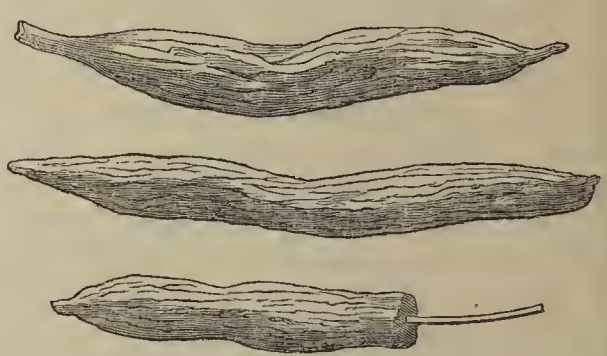

Fig. 12.

Ophiopogon Japonicus, a low perennial with a creeping rhizome, produces small tubers as expansions of the radical fibres: that they are really identical with the drug found in the Chinese shops, I have been able to convince myself by actual comparison. Kæmpfer, who figures the plant well, states that a second species called in Japanese *Temondo*, and common in the province of Satzuma, produces larger tubers, and is therefore preferred. Two varieties of *Ophiopogon Japonicus* are described by Thunberg;† one of them may possibly be identical with Kæmpfer's *Temondo*. According to Loureiro, the tubers of his *Commelina medica* (*Aneilema* R. Br.) are called *Mĭh-mun-tung*.

The drug under notice is in frequent use among the Chinese, the candied tubers being eaten as a medicine.

天門冬 *Tëĕn-mun-tung;* Tubers of *Melanthium Cochinchinense* Lour.; *Tian-myn-dun*, Tatarinov, *Catal. Med. Sinens.*, p. 56; *Pun-tsaou*, fig. 401.

These, like the preceding, are fleshy, translucent, yellowish-brown tubers, of the thickness of a writing quill to that of the little finger, and often $3\frac{1}{2}$ inches in length. They are usually flattened, and more or less contorted and longitudinally furrowed. They have a mucilaginous, slightly saccharine taste, but do not possess any marked odour.

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* *Journal Asiatique*, Oct., Nov., 1852, p. 286.
† *Flora Japonica*, p. 139.

Loureiro states that this drug is regarded as diaphoretic and expectorant, and that it is administered in phthisis and also (in the form of decoction ?) to allay feverish thirst and heat. It is also preserved with sugar as a sweetmeat. It appears to be produced in the province of Chekiang. According to Loureiro, the plant is frequent in dry hedges both in Cochin China and China.

木香 *Mŭh-heang;* Root of *Aucklandia Costus* Falc. (*Compositæ*), *Linn. Trans.*, vol. xix., part i. (1842), p. 23; *Aplotaxis Lappa* Decaisne, in Jacquemont's *Voyage dans l'Inde*, tome iv. (1844), *Botanique*, p. 96, pl. 104; *Mu-sian*, Tatarinov, *Cat. Med. Sinens.*, p. 40; *Mŏ hiam̄*, Cleyer, *Med. Simp.*, No. 18; *Costus Root* or *Putchuk*.

This root is collected in enormous quantities in the mountains of Cashmere, whence it is conveyed to Calcutta and Bombay, and there shipped for China.

The drug has a pungent, aromatic taste, with an odour resembling that of orris root. There is an excellent account of it, with a figure, in Professor Guibourt's *Histoire des Drogues*, tome iii., p. 25.

川烏 *Chuen-woo;* Root of ? *Aconitum* sp. (*Ranunculaceæ*). Conical or top-shaped tuberous roots (fig. 13), about 1½ inches in length, covered with a blackish brown cuticle; internally they are white and amylaceous. They taste slightly bitter, and leave a persistent sensation of numbness and tingling on the tongue, with some acridity in the throat.

Fig. 13.

Ground to powder, and mixed with an equal quantity of the root *Tsaou-woo* (next described) and of the flowers *Naou-yang-hwa*, also in powder, a compound is obtained which is reputed to produce local anæsthesia. This powder, moistened, is to be applied to the surface of the part to be operated upon for two hours previous to the operation, by which means, it is alleged, insensibility to pain will be produced.

草烏 *Tsaou-woo;* Root of *Aconitum Japonicum* Thunb.; Tatarinov, *Catal. Med. Sinens.*, p. 5. Blackish tuberous roots analogous to the last, but smaller in size and less regular in form (fig. 14). They are from $\frac{6}{10}$ of an inch to upwards of one inch in length, and from $\frac{2}{10}$ to $\frac{4}{10}$ of an inch in diameter; oblong or ovoid, either tapering or rounded at their extremities, covered with a smooth or furrowed blackish cuticle; internally, they are white and inodorous. They are used with the preceding for producing insensibility to the pain of a surgical operation. According to Dr. Christison,* they are also the basis of an extract used to poison the arrows employed for killing game. Dr. C., who examined some of this extract, reported that it had evidently been prepared with care and skill, and that a minute portion of it, applied to the tongue or lips, occasioned an intense sensation of numbness and tingling.

Fig. 14.

This aconite root is said to be produced in the province of Chekiang; I refer it to *Aconitum Japonicum* Thunb. upon the authority of MM. Hoffmann and

* On a New Poison from the Interior of China, *Edinb. Medical Journ.*, April, 1859, p. 869.

Schultes,* but it is highly probable the Chinese name is not restricted to a single species.†

青木香 *Tsing-mŭh-heang;* Root of *Aristolochia* sp. ? Tatarinov, *Catal. Med. Sinens.*, p. 12.

A grey, brittle root, of the thickness of a goose quill, whitish and farinaceous internally. It has a slightly aromatic taste, with but little smell: referred to an *Aristolochia* in Tatarinov's Catalogue.

(To be continued.)

DESCRIPTION OF CASELLA'S NEW MERCURIAL MINIMUM THERMOMETER.

BY MR. J. ATTFIELD.

Although registering thermometers are, strictly speaking, meteorological rather than pharmaceutical instruments, they, nevertheless, are so frequently used by chemists and physicists, as well as by the more scientific portion of the public generally, that a description of one that accomplishes what no other has yet been able to effect, namely, correctly and invariably record the lowest temperature that has occurred during a given time, will probably much interest the readers of the *Pharmaceutical Journal.*

Reference to the accompanying figures will at once render easy of comprehension the principle of action and working of this simple and beautiful instrument.

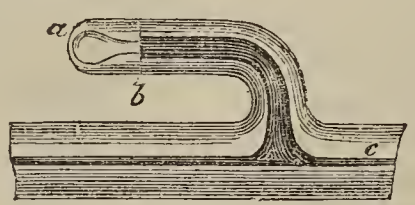
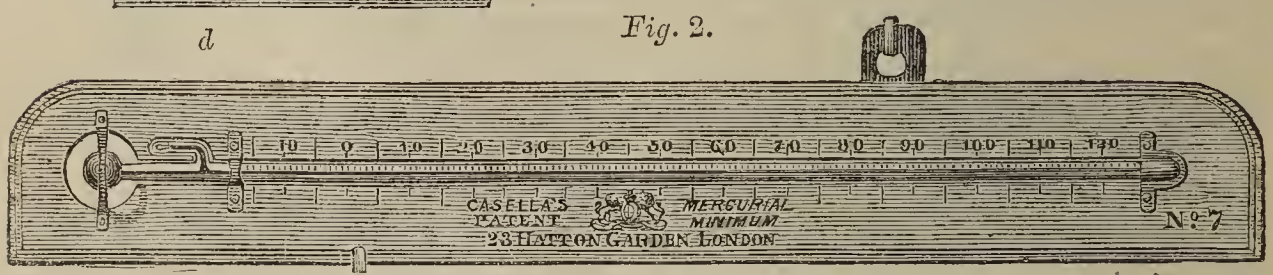


Fig. 1.

Fig. 2.



At *d*, fig. 2, is an addition to the ordinary bulb and stem of the common thermometer. This addition, of which fig. 1 is an enlarged representation, is a short glass tube bent at right angles, and having in the centre of its flat extremity at *b*, a small aperture communicating with the little pyriform chamber, *a*. The stem is graduated, not when the whole of the lower part of the thermometer is full of mercury, as is usually the case, but when the fluid occupies every portion except the little chamber. This is readily accomplished by elevating, more or less, the bulb extremity out of its horizontal position, when, by the mere action of gravity, the mercury will run down, or, as we should popularly say, run up the stem, receding from the uppermost part, *a*, until it arrives at the diaphragm, *b*; it will then suddenly stop, the mercurial column in the long stem also, of course, stopping simultaneously. The gravitating force of the quicksilver is, in fact, here counterbalanced, and indeed overcome, by the amount of adhesive force existing between the metal and the flat glass surface, *b*: upon this action the peculiar value of the whole instrument depends. If the amount of gravitating force acting on the mercury be unnecessarily increased, as, for example, by lifting

* *Journ. Asiatique*, Oct., Nov., 1852, p. 271.

† Maximowicz enumerates nine species of *Aconitum* as occurring in the region of the Amoor, four in the neighbourhood of Pekin, and three in Mongolia.—*Primitiæ Floræ Amurensis*, St. Petersburg, 1859.

up the bulb end until the thermometer assumes more nearly a vertical position, then, of course, the adhesion at *b* will in its turn be overcome, and the mercury will flow out down to the extreme end of the long stem.

The new thermometer having been graduated and mounted in the usual way, it is suspended horizontally, as shown in the drawing; the bulb end is next raised, and, if necessary, gently tapped, until the mercury begins to flow out of the chamber, *a*; then lowered down almost on to its support, and kept in that position until the moving column in the long stem suddenly stops. Leaving it now resting on its lower brass hook, the instrument indicates the temperature of the surrounding air; it is, in fact, adjusted or "set," and is influenced by decrease or increase of heat, as follows:—If the air in the neighbourhood of the bulb becomes colder, the cohesive force of the mercury in contracting will, as in the case of other thermometers, overcome the adhesion between the mercury and the glass in the capillary bore of the long stem, and will "fall," as the motion is commonly termed. This contracting force is not, however, sufficiently intense to overcome the larger amount of adhesion existing at *b*; the mercury will remain perfectly stationary there, and the instrument having been graduated under this condition, as already described, an inspection of the point of termination of the mercurial column in the stem at any time during the "falling" of the thermometer, will, of course, indicate the exact temperature at the moment of observation. But on a rise of temperature occurring, the long column in the stem will not move in the slightest; it will remain true to its minimum point. The fact is, that the expansion, or increase, which occurs in the volume of the mercury on its receiving an addition of heat, and which expansion is sufficiently powerful in the case of the ordinary thermometer to overcome the resistance caused by the adhesion of the mercury to the interior of the stem, is, in the new thermometer, expended in forcing the mercury in a direction where there is little or no resistance, namely through the aperture in the centre of the diaphragm, *b*, into the chamber, *a*. There it remains unless subsequent re-contraction again withdraws it, or until tilted out by the observer in the manner already mentioned.

Scientific men have long desired that both extremes of temperature should be determined by the expansion and contraction of the same, instead of different fluids. The late talented director of the Kew Observatory tried again and again to attain this end, and at length declared that he thought the construction of a registering mercurial minimum thermometer to be a physical impossibility. Added to the above, spirit of wine, the agent hitherto used for the purpose with least objection, possesses several disadvantages. Being a bad conductor of heat, it is "sluggish" in its movements, it "wets" the capillary bore, and that so unequally as to preclude compensation in graduation; it is liable to evaporate and condense in minute, colourless, almost invisible bedewments in the vacuous portion of the stem, especially behind the bridles which secure the glass to the wood or other mounting; and in tropical countries these objectionable features are intensified. Finally, a mercurial thermometer can obviously be made more delicate than a spirit one, and mercury can easily be obtained pure and constant in properties, which is more than can be said for alcohol.

The correct appreciation and application of scientific principles displayed in the construction of this thermometer, reflects great credit on the inventor, Mr. L. M. Casella, jun. It is an instrument which requires no unusual care in transit, and is unaffected by vicissitudes of climate. From a short trial which has been made at Kew Observatory, it is pronounced to be practically, as well as theoretically, unobjectionable. It must, of course, like all other registering thermometers, be suspended where it is not likely to be subjected to powerful vibration, as obviously the adhesion at *b* cannot be very great in amount, and is, in fact, easily overpowered by rough treatment.

ANOTHER POINT IN QUESTION.

BY MR. A. F. HASELDEN.

"——Neque semper arcum
Tendit Apollo."—*Horace*, Lib. 1, Ode x.

Although our bows must not always be on the full stretch, still as the recess which intervenes betwcen our annual sessions has been brought to a close, so must the bow-strings which have been unstrung be once more tightened, the relaxation and holiday which, it is to be hoped, all have enjoyed in a greater or lesser degree as far as opportunity and business have permitted, must again be succeeded by labour, energy, and assiduous application. Our monthly evening Mcetings have been inaugurated by the distribution of prizes, and our Professors have already commenced their arduous but gratifying labours, and I need scarcely remind our Members and Associates that it behoves every one to endeavour to add as much as possible to the interest of the meetings, and encourage the Professors by assisting in increasing the number of their pupils.

During the past months many valuable letters have been published in the Journal upon subjects highly interesting to every one connected with the Pharmaceutical Society, and it is gratifying to observe that, though differences of opinion exist, one object seems decidedly to animate the whole body of contributors, namely, the honour, credit, stability, proper management, and future advancement of the Society. Moreover, this very correspondence has shown in some degree the kind of material of which it is composed, and how desirable and valuable (we might reasonably expect) would be communications to the Editors of our Journal upon other subjects belonging to our vocation from those who have recently written so well and so ably upon certain points, could they but be prevailed upon to write upon other matters interesting to the Members. I know full well how difficult a thing it is to find new or interesting matter for contribution to the pages of the Journal, and with this knowledge can well understand the feeling which limits, I may almost say, the number of our general contributors. It has sometimes been said in disparagement of the Journal, that it contains too little that is useful to Members generally, for whose perusal its pages are supposed chiefly to be written; and, whilst referring to this point, let me quote from a letter in the last number of the Journal, wherein a correspondent, referring to the suggestion that Members should pay for the Journals or postage, says, "that necessitates the query, what are the Journals worth? Can the science of Pharmacy produce a Journal worth perusal? If so, why is it month after month filled with abstruse chemical data in application to the arts or physical investigations? They are all very well in their way, and interesting to the man of science, but comparatively worthless to the Pharmaceutical Chemist." Whether it does touch too much upon scientific chemistry and too little upon pharmacy and trade chemistry, each reader must determine for himself, but I feel bound to say, that be its defects what they may, such information upon pharmaceutical preparations has been given continually in it, as would not without it, in all probability, have ever been forthcoming, and I would also advance that no journal could be, or is ever likely to be written, equally adapted to every one. Practical pharmacy and trade chemistry, with a dash even of perfumery, should undoubtedly fill a large share of the pages of the Journal, but did they alone comprise its contents, it would be deprived of a very great amount of the interest now attached to it, and it would be a difficult task for any editor or number of editors to find sufficient novel and interesting pharmaceutical material to fill the pages even of a small journal; but I will now venture briefly to suggest how

some additional interest might be sustained; to wit, by the aid of all those connected with the Society; every Member, every Associate, and every registered Apprentice should take an individual interest in it, and should look upon it, as truly it is, as part of his own property, and should not forget the fact, that several thousand copies are sold every year, independently of those appropriated by the Society for its own Members, &c., and that every such copy is a direct support to, and extension of, the Pharmaceutical Society; bearing this in mind, every one should try to do something for it, and yield some portion of his practical knowledge and experience as a contribution to it. I do not mean to say that the man who has, after close application, and at some considerable expenditure of time and money, achieved what he conceives to be perfection in a particular product, is at once to publish the same for the information of those who had as yet never perhaps cast a thought upon it—but there are points which come under the observation of some men which others do not meet with, but would be glad to hear of, and which might readily be communicated without detriment to the interests of any; little points which our Editors can scarcely be expected at all times to think of, although perfectly conversant with them. It may not, perhaps, be too insignificant a thing to mention that podophyllin is now coming into almost daily use; it has been found to act well as an aperient, and has even been suggested as a substitute for mercury in biliary and other disorders. The dose is from one to three grains when administered uncombined with aperients, and a quarter or half a grain in combination with other cathartics, to quicken the action of them; and it may not be altogether foreign to the purpose to state, that in America it has been used, and it is said with success, against the distemper which is frequently fatal to puppies. Again, in reply to *Inquisitive* (Windsor), in addition to the information already given him, I may mention that glycerine will dissolve half its weight of tannin, and, if desirable, a preparation of that strength could be made, but one more convenient for dilution when required can be prepared thus:—Into a bottle capable of holding six or eight fluid ounces, and graduated with a mark at four fluid ounces, put two ounces of powdered tannin; add to this as much pure glycerine, density 1.26, as will reach the marked four ounces; shake it from time to time for several days, and, when all the tannin is dissolved, if necessary add as much more glycerine as will bring it to the required measure of four ounces; strain this through muslin, to separate any chance fragments of undissolved impurity; there will then be, as near as possible, a solution, one fluid drachm of which contains half a drachm, and one fluid ounce half an ounce, of tannin. Such a solution has been found very convenient. Again, with respect to the Quillai Bark, it has been used in the shape of decoction medicinally as a detergent in cases of tendency to baldness of hair and scurfiness of the scalp, and in powder as a dentifrice, and domestically as being one of the most effective agents for cleansing all articles of dress from stains of grease and other impurities. The decoction, according to Messrs. Butler and McCulloch, for use is made by boiling one ounce in a pint of distilled water for a quarter of an hour. Again, when the ammoniated solution of quinine is kept in quantity, if exposed to light it soon acquires a brownish tint, which renders it unsightly, and if so sent out likely to bring discredit upon the vendor. These hints, though slight and not new to all, may still be acceptable to some. Hoping and believing that I have touched upon another point of interest, I now leave my subject in the hands of those best qualified to judge of its value and truthfulness.

18, *Conduit Street, 7th October*, 1861.

REPORT OF THE

RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,

AND OF THE

APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

Chemical Relations of Guanine, Zanthine, Theobromine, and Caffeine.—M. Strecker has shown that guanine, the characteristic base of guano, is transformed by the action of nitrous acid into zanthine, a principle found in the human urine and other fluids of the animal economy. Some doubts were at first thrown on the identity of the zanthine so artificially prepared, with the natural body. The recent experiments of M. Strecker show that the properties of the two substances are exactly the same. Zanthine is a feeble base, which forms crystallizable salts with the acids, and unites with chloride of platinum to form a double salt. In treating guanine with a mixture of chlorate of potash and dilute hydrochloric acid, we obtain a powerful organic base named *guanidine*, parabanic acid, and carbonic acid. The guanidine possesses an alkaline reaction. Exposed to the air, it attracts water and carbonic acid, and deposits colourless crystals of carbonate of guanidine, which contain $C_2H_5N_3$, HO, CO_2. This salt possesses an alkaline reaction; it dissolves readily in water, but is insoluble in alcohol. The hydrochlorate of guanidine crystallizes easily in deliquescent needles. It is neutral, and gives with chloride of platinum a double salt, which contains $C_2 H_5 N_3$, H Cl, Pt Cl_2. The nitrate of guanidine crystallizes easily. Of all organic bodies known, guanidine appears to be the richest in nitrogen, of which it contains 71 per cent.

Transformation of Theobromine into Caffeine.—The three bodies, zanthine, theobromine, and caffeine, appear from their composition to be homologous bodies.

Zanthine ..... $C_{10} H_4 N_4 O_4$.
Theobromine..... $C_{14} H_8 N_4 O_4$.
Caffeine .... $C_{16} H_{10} N_4 O_4$.

From the facility with which theobromine and caffeine yield methylamine, M. Strecker supposes the first of these bodies to be dimethylated zanthine, and the latter trimethylated zanthine. Proceeding from this point of view, the author has succeeded in converting theobromine into caffeine. Theobromine gives with an ammoniacal solution of nitrate of silver a crystalline precipitate, which, dried at 120°, contains $C_{14} H_7 Ag N_4 O_4$. When this compound is heated for some time at 100° with iodide of methyl, a reaction takes place, in which iodide of silver and caffeine are formed. as follows:—

$$\underbrace{C_{14} H_7 Ag N_4 O_4}_{\text{Argentic theobromine.}} + C_2 H_3 I = Ag I + \underbrace{C_{16} H_{10} N_4 O_4}_{\text{Caffeine.}}.$$

The author in a similar manner endeavoured to produce theobromine from zanthine. When the diargentic zanthine ($C_{16} H_2 Ag_2 N_4 O_4$) is heated with iodide of methyl, a body is produced ($C_{10} H_2 (C_2 H_3)_2 N_4 O_4$), having the same composition as theobromine, but which differs in some of its properties.

On the Constitution of Aloes.—M. C. Kosmann has recently published the result of an interesting investigation into the nature of aloes, from which it appears that this substance, like several others of its class, is really a glucoside. He shows that in its natural state aloes consists of two substances, the one soluble, the other insoluble in water, both being soluble in alcohol. The first partakes of an extractive, the second of a resinous nature. Both are bitter; both absorb oxygen, especially when dissolved in a weak solution of caustic soda. Both consist of combinations of peculiar acids with a hydrate of carbon, capable of furnishing under the influence of acids a body answering to the reactions for grape sugar.

The following are the experiments from which M. Kosmann deduces the foregoing conclusions:—Fifty grammes of pure Cape aloes were ground with water until all the soluble portion was dissolved; after decantation, the insoluble part was washed with water about twenty times, or until the water came away colourless and tasteless. The aloes was thus resolved into a soluble portion (*A*), and a part undissolved (*B*). *A* was filtered and preserved in a well-closed bottle. *B* pre-

sented the appearance of a fine brilliant golden-yellow, and very elastic resin. It was boiled with 300 grammes of water and 15 grammes of oil of vitriol for three hours. During this ebullition the resin of aloes was transformed into a brown, hard, brittle mass (*C*). The resulting liquid, of a fine yellow, was filtered and saturated with carbonate of baryta, then again filtered and evaporated to the consistence of an extract. One part of this extract was dissolved in water and heated with a solution of tartrate of potash and copper. An abundance of the red suboxide of copper was precipitated. The remainder of the extract was dissolved in water, and the solution mixed with yeast. In a short time fermentation commenced, a plentiful evolution of carbonic acid took place, and on distilling the liquid alcohol was obtained. The separation or formation of glucose was thus demonstrated.

The hard brown resin (*C*), after repeated washings to remove the whole of the sulphuric acid, was entirely dissolved in boiling alcohol. The solution was filtered and evaporated. A brown scaly residue was left, which reddened litmus paper. It was warmed with a solution of bicarbonate of soda, in which it dissolved with effervescence, excepting an insignificant quantity of a black friable matter. The solution which had a reddish-brown colour was evaporated, and the residue redissolved in alcohol of 85 per cent. The alcoholic solution was evaporated to a syrupy consistence. It emitted an aromatic odour resembling an alkaline infusion of rhubarb. By standing it dried into brilliant brown scales, which separated easily from the dish. These were dissolved in water, forming a reddish-brown solution, and sulphuric acid added. A granular yellow precipitate was thrown down, which after some hours assumed a crystalline aspect, being composed of little kermes coloured brilliant grains. It was thrown upon a filter and washed. This body was not absolutely insoluble in water, the washings passing through of a yellow colour. After drying it presented the appearance of brown grains, having an odour of castoreum, almost without taste, but slightly astringent.

This substance was next treated with ether several times. A portion dissolved and a part remained insoluble. The etherial solution was of a yellow colour, and by spontaneous evaporation yielded a yellow substance, which crystallized over the dish in a beautiful arborescent form, composed of aggregations of small prisms belonging to the oblique prismatic system. This substance, which formed only a small proportion of the original, presented a slight odour of castoreum and strongly reddened litmus paper. This substance the author has named *aloeresinic acid*. It presented the reactions of an energetic resin acid. Its alcoholic and etherial solutions presented a piquant acid taste. It decomposed bicarbonate of soda with effervescence, forming a salt soluble in water and alcohol. The alcoholic solution of this *aloeresinate of soda* yielded, by spontaneous evaporation, a confused radiated mass of minute crystals. The aqueous solution, when treated with dilute sulphuric acid, yielded the resinous acid in the form of yellow flakes.

The part of the resin (*C*) which was insoluble in ether, was dissolved in alcohol. The filtered solution was evaporated spontaneously; it had a slightly bitter and astringent taste, and yielded a dry brown cracked residue. Purified by re-solution and re-evaporation, it was obtained in the form of micaceous, brittle scales, almost crystalline, reddening litmus paper, and of a slight bitter taste. The author names this body *aloeretinic acid*. This acid was divided into two parts: one was treated with water and bicarbonate of soda, the other with bicarbonate of potash. Effervescence on solution took place in both cases. Each solution was evaporated to dryness, and the residue treated with alcohol. Partial solution only took place. A portion of the resin had become altered by oxidation from contact with the air, and remained insoluble in the spirit. The solutions were filtered, and each evaporated to a syrupy consistence. The potash salt gave visible indications of granular crystallization, and possessed an agreeable aromatic odour. The soda salt furnished prismatic crystals, in the form of brown interlaced needles. It possessed the same aromatic odour before drying. This salt was dissolved in water, the solution divided into five parts, and treated as follows:—

1st. With a hot solution of sulphate of quinine, dissolved in water without the addition of sulphuric acid. It yielded a brown precipitate, which was washed and dried, and dissolved in alcohol. This solution yielded by evaporation a salt in the

form of crystalline scales, which reflected the light in a beautiful iridescent manner. It formed a beautiful object under the microscope. It constituted the *aloeretinate of quinine*. 2. With sulphate of strychnia a brown precipitate, also soluble in alcohol, and yielding brilliant granular crystals. 3. With acetate of morphia, a crystalline precipitate, which equally furnished a very beautiful salt from alcohol. 4. With sulphate of iron, a greenish-brown precipitate. 5. With perchloride of iron a brown.

The aloeretinate of potash was dissolved in water and treated with dilute sulphuric acid. The precipitate was washed and dried and dissolved in alcohol. The solution yielded by evaporation brilliant brown grains, not bitter, reddening litmus paper, and having the appearance of kermes. This body constituted the *aloeretinic acid*.

The part (*A*) which was dissolved out by the cold water from the original aloes, was in its turn boiled for four hours with thirty grammes of oil of vitriol and a sufficient quantity of water. During the ebullition a strong odour of aloes was emitted. The resin which was at first precipitated by the acid redissolved during the boiling. After the four hours the liquid was allowed to cool, when it deposited a blackish brown glutinous resin; by the addition of water a fresh quantity of resin was precipitated. After standing for a sufficient time, the liquid was decanted, and the resin (*D*) entirely freed from acid by washing and then dried.

The acid liquid was neutralized with carbonate of baryta, filtered and concentrated. During evaporation it gave off a nauseous odour of molasses. The resulting dark brown and very impure syrup reduced oxide of copper and nitrate of bismuth, and yielded alcohol and carbonic acid by fermentation.

The resin (*D*) was treated with alcohol, in which it almost entirely dissolved, the solution filtered and evaporated spontaneously. A brown mammelated mass remained. This yielded to ether a very small portion of a yellow matter acid to the taste, and litmus, which was obtained by evaporation in the form of little mammelary grains. This body the author names *aloeresic acid*. The resin insoluble in ether was warmed with bicarbonate of soda and water. It dissolved with effervescence. The brown liquid, filtered and evaporated to dryness, gave a residue which was treated with boiling alcohol: a part dissolved and a part remained insoluble. The solution yielded by evaporation and treatment with dilute sulphuric acid a brown body in the form of mammelated brilliant odourless grains, reddening litmus, which the author names *aloesetic acid*. The part insoluble in spirit yielded by several treatments a brown micaceous body, not acid, which was named *aloeretine*.

The author also found by boiling either the insoluble or the soluble portion of aloes with the potassio-cupric test-liquid and a quantity of caustic soda that the oxide of copper was reduced; from which he infers that a caustic alkali can, like sulphuric acid, separate the aloes into glucose and the electro-negative resins. These resins, when in combination with an alkali, possess a powerful attraction for oxygen. Five grammes of aloes were dissolved in caustic soda and the solution placed in a graduated burette over mercury with a known volume of air. The liquid began to rise almost immediately, and in about five days had absorbed the whole of the oxygen present. Aloes in this respect resembles tannin, which also oxidizes rapidly when combined with an alkali. The analogy between these two bodies is also interesting, because both are natural products of the vegetable kingdom, and both are constituted as glucosides.

On Rubidium and Cæsium.—M. Bunsen has recently published a detailed account of some of the compounds of these two metals, rubidium and cæsium, which were discovered by him during his investigation of the method of spectrum analysis. He states that rubidium is more electro-positive in its relations than potassium; that it amalgamates easily, and decomposes cold water. Its equivalent is 85.36 (H=1).

The hydrate of rubidium (Rb O, HO + Aq.) is soluble in all proportions in water and alcohol. When heated, it fuses in its water of crystallization, which then evaporates, leaving Rb O, HO, which fuses at a higher temperature without loss of

weight. It behaves like caustic potash, absorbing water and carbonic acid from the air, and dissolving in water with the liberation of heat.

The carbonate (Rb O, CO_2 + Aq.) forms badly defined crystals, presents a strongly alkaline reaction, fuses in its water of crystallization, and becomes anhydrous. This salt is fusible, deliquescent, and takes from the air a second equivalent of carbonic acid. Its aqueous solution saponifies the skin like carbonate of potash.

The bicarbonate (Rb O, 2 CO_2 + HO) constitutes brilliant prisms, unaltered by the air. It has a slight alkaline reaction and a fresh taste, not caustic.

The nitrate (Rb O, NO_5) does not crystallize in rhombohedric prisms like nitre, but in prisms with an hexagonal base, which is the second form of nitrate of potash. It dissolves in 5 parts of water at 0°, and in 2.3 parts of water at 10° Cent.

The sulphate (Rb O, SO_3) is isomorphous with that of potash. At 7° Cent. it dissolves in 2.4 times its weight of water. It is, consequently, more soluble than the sulphate of potash, which requires 10.4 times its weight of water for solution. With sulphate of magnesia it gives a very fine octahedric salt, and with sulphate of cobalt another double salt in beautiful crystals isomorphous with Co O, SO_3 + KO, SO_3 + 6 HO. The bisulphate can be fused at a moderate temperature without decomposing, but a greater heat reduces it to the neutral salt.

The chloride of rubidium is cubical, but crystallizes with difficulty. It fuses and volatilizes on platinum wire. At 7° Cent. it dissolves in 1.3 to 1.2 parts of water. K Cl requires 3.4 parts. The double chloride of platinum and rubidium, Rb Cl + Pt Cl_2, is a crystalline powder, composed of microscopic octahedra. It differs from the corresponding potassium compound by its less solubility. It requires 158 times its weight of boiling water for solution, while the platino-chloride of potassium requires only 19 times its weight.

The equivalent of *cæsium* is 128.4. It is, therefore, very high, and ranges with iodine and gold. The double chloride of platinum and cæsium is even less soluble than that of rubidium.

The hydrate of cæsium (Cs O, HO + Aq.) is deliquescent; when heated it loses an equivalent of water, attacks platinum, and is volatilized readily in the flame of alcohol. It is soluble in alcohol.

The carbonate (Cs O, CO_2 + Aq.) crystallizes badly. At 19° Cent. it dissolves in 9 times, and at 78° Cent. in 5 times its weight of absolute alcohol. It is very caustic, liquefies in the air, and is transformed into bicarbonate. It is soluble in all proportions of warm water. The bicarbonate crystallizes in brilliant prisms.

The nitrate is anhydrous, like that of potash, with which it is isomorphous. It possesses the taste of saltpetre.

The sulphate of cæsium is equally anhydrous. It crystallizes badly. At 2° Cent. one part of the salt requires 0.63 parts of water for solution. It forms double salts with sulphate of magnesia, &c., which are isomorphous with those of sulphate of potash and of ammonia. With sulphate of alumina the sulphate of cæsium forms a very brilliant alum.

The chloride crystallizes in cubes, but it is distinguished from the chlorides of potassium and rubidium by being deliquescent like chloride of lithium. It is fusible and volatile at a comparatively low temperature. Cæsium is less abundant than rubidium, although it generally accompanies it. The richest medium is the saline water of Durckheim; ten kilogrammes of this water contains two milligrammes of chloride of cæsium. It is, therefore, from the residue of the evaporation of this water that its compounds have been prepared; by precipitating the alkaline platino-chlorides, and separating these by the solvent action of water. The cæsium compound is the least soluble, and possesses the highest equivalent. The lepidolites contain only traces of cæsium; they are, on the contrary, rich in rubidium. The Moravian lepidolite contains 2-thousandths of its weight of oxide of rubidium, and the Saxony mineral is even richer. The saline mineral waters also contain it; that of Durckheim contains 2-millionths, and sea water about 400-thousandths of chloride of rubidium.

ON THE USEFUL PLANTS OF PARAGUAY.

BY DOMINGO PARODI.*

(*Continued from page* 215.)

Ibiá-guazu (Guarani), *Acederilla* (Spanish).

Ibia-mini (Guar.), *Aleluya* (Span.). These names are applied to species of *Oxalis*, distinguished by the form of their leaves. The radical tubers of the *Ibiá-guazu* are edible, and from its leaves when boiled, cataplasms are prepared, which are applied to ulcers or wounds, as well as in cases of ringworm and scrofula; the viscid decoction is employed in jaundice and calculous disease. The decoction allowed to macerate with iron filings is a popular medicine for the cure of leucorrhea and amenorrhea.

Isipó-monotí, *Isipó-curuzú*, *Caapevá* (Guar.), *Bejuco de la cruz*, *Palo de culebras*, *Palo de vívora* (Span.); *Chiococca anguifuga*, Mart. (*Rubiaceæ*). Various climbers belonging to distinct orders, such as *Bignoniaceæ*, *Asclepiadeæ*, *Leguminosæ*, *Passifloreæ*, &c., are known under the generic name of *Isipó*. The root of the *Isipó monotí* applied in the form of powder to the bite, and the decoction taken internally, are reputed the most potent vegetable antidote to the deadly poison of vipers and *cerastes*. The name *Isipó-monotí* or *Isipó-payé*, is likewise applied to a climber having a milky juice, which appears to be a species of *Convolvulus*. *Isipó-payé*, signifying "*sorcerers' climber*," is a name applied under the idea that the plant possesses the power of preventing or destroying the effects of the evil eye or witchcraft.

The flexible stems of the *Isipos* are the ropes and cords which the inhabitants use in binding the roofing of the farm-houses; they also serve for making baskets, and for many analogous purposes. The *Isipos* thus used are mostly derived from *Leguminosæ*.

Ipé-mí (Guar.); *Aristolochia* sp. The roots of these climbing plants are stimulant, sudorific, and emetic, properties due to the essential oil and bitter resin which they contain. They are used as an emmenagogue, but it is as a most efficacious remedy for snake-bites that they enjoy special credit. It will not be surprising that the greater number of plants possessing active properties are used for this latter purpose, if there be borne in mind the infinity of venomous serpents that infest the extensive forests of the country, and constantly threaten the life of the peasant, who, in his isolation, finds himself compelled to employ every resource, more or less efficacious, which nature offers.

Ibápohy (Guar.), *Higueron* (Span.); *Ficus Ibapohy* (*Urticeæ*). A plant sometimes parasitic on the *Iataí* palm; the pulp of its fruit is sweet and edible.

Ibopé (Guar.), *Algarrobo* (Span.); *Prosopis dulcis* H. B. (*Leguminosæ*). A common tree, of which there are two varieties, the *white* and the *black*. It attains an altitude of 30 to 50 feet; its wood is white, fibrous, and strong, used for beams and firewood. The fermented decoction of the fruit affords an alcoholic liquid called *Chicha*; the bark of the tree is used in tanning, also in dyeing black. The pods are edible; when ground they afford a sweet farina, from which a sort of bread is prepared.

There is known under the name *Algarobilla* a tree of large dimensions, which, from the gravity and colour of its wood, is also called *Guayacan negro*. The bark and fruit are highly astringent, whence they are useful in dyeing and tanning. These *Algarrobos* are totally distinct botanically from the plants known in Spain under the same name.

Ibopé-guázú (Guar.), *Caña fistula* (Span.); *Cassia brasiliana* Lam. (*Leguminosæ*). A large and very beautiful tree; its legumes, from 1 to 1½ feet in length, are sometimes employed as a purgative, notwithstanding that the pulp which they contain is somewhat bitter and disagreeable. The tree is not common in the vicinity of the capital.

Ibopé-pará (Guar.); Nat. ord. *Leguminosæ*. Legumes used in tanning and dyeing black; wood light and pale.

Ibotí la novia (Guar.); *Bellis perennis* L. (*Compositæ*).

Ibotí-pitá (Guar.); *Carduus* sp. (*Compositæ*).

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* *Revista Farmaceutica de Buenos Ayres*, April—July, 1861.

Ibotí-yubá (Guar.); *Chrysanthemum* sp. (*Compositæ*).

Icica (Guar.); *Icica Icicariba* D. C. (*Terebinthaceæ*). A tree producing elemi. Under the same name (*Icica*), various resinous trees belonging to the genera *Icica*, *Amyris*, or *Bursera*, are confounded. From one species an incense-like resin is extracted, which is burned as a perfume in churches and private houses. We may also mention that there occurs, under the name of *Incense* or of *Storax*, a blackish, aromatic, resinous substance, of spongy appearance, which is formed by a small bee called *yateí*; it has the properties of the propolis found in beehives, but with an aroma much more agreeable. The cylindrical form of that obtained from the missionaries arises from it having been melted and moulded in a tube.

Igary (Guar.) *Cedro* (Span.); a variety of *Cedrela odorata* L.

Maquichí (Guar.), *Romaza* (Span.); *Rumex* sp. (*Polygonaceæ*). Root diuretic.

Manduví, *Maní*, or *Cacahuete*; *Arachis hypogæa* L. Seeds oleaginous and edible; oil was formerly extracted from them.

Manduví-guazú (Guar.), *Alfóncigo* (Span.); *Pistacia* sp. A resinous tree yielding a useful white wood.

Manduví ná (Guar.); a variety of the *Maní*.

Mangá-rupiá (Guar.), *Hongo* (Span.); *Agaricus* (*Cryptogamia*).

Mangaratiá (Guar.), *Gengibre* ; *Zingiber* sp. (*Amomeæ*).

Mangá-yá or *Mangá-isí* (Guar.); *Jatropha elastica* Lin. fil. (*Euphorbiaceæ*). A tree of forty to fifty feet in height, abounding towards the north of the republic. Some hundreds of arrobas of caoutchouc have been extracted from this tree and exported by way of experiment, but the project has been abandoned, owing to the heavy charges incurred in the transport of the article from the interior to the river's banks. The caoutchouc is of excellent quality.

Mbaicibó or *Tartago* (Guar.), *Ricino* (Span.); *Ricinus* sp. (*Euphorbiaceæ*). Cultivated with the greatest facility, and very plentiful. There are two varieties, both yielding castor oil of superior quality. The ashes of the plant are highly alkaline.

Mbiyiú-caá (Guar.); *Chelidonium* sp. (*Papaveraceæ*).

Mboy-caá (Guar.). Regarded as a potent antidote to the bites of serpents.

Mburucuyá (Guar.), *Granadillas* (Span.); *Passiflora* sp. Four species of passion-flower are distinguished by the colour of the fruit, viz. the scarlet, yellow, purple, and black. The black is reckoned the most medicinal, but its roots, as well as those of the others, notwithstanding their reputed virtues, are probably nearly inert. The fruits of all four species are edible.

Mbuy-ibotí-sayubá (Guar.), *Vara de Oro* (Span.); *Solidago* sp. (*Compositæ*). Flowering tops used to dye cotton goods yellow.

Mbuy-ná-caá (Guar.); *Scrophularia* sp. Plant bitter, fœtid, used in decoction as a tonic and vermifuge.

Mecaguá (Guar.); *Smilax* sp.

Morosimó. Wood used for furniture.

Molle or *Aguaraybay-mí* (Guar.); *Schinus* sp. (*Terebinthaceæ*). Wood aromatic and resinous, used for furniture; bark for tanning. A balsam resembling that of the *aguará-ibá* prepared from the leaves.

Mamon (Guar.); *Carica Papaya* L. (*Papayaceæ*). A tree of eighteen to twenty-four feet high, with a straight, cylindrical stem, crowned with leaves. The fruit is egg-shaped, pyramidal, and unilocular, with numerous seeds dispersed through a yellow, sweet, aromatic pulp. It is eaten either raw, or preserved with sugar as a conserve; macerated in vinegar previous to maturity, it constitutes a good pickle. The juice of the *Mamon* is milky, and contains a notable proportion of albumen and vegetable fibrine. Cordage of considerable tenacity can be made of the fibrous bark. It is said that the leaves have the effect of rendering fresh meat tender in a few minutes. The *Yacaretiá* is a species of *Carica*, with a fruit smaller, but equally edible, although insipid.

Mandiyú (Guar.), *Algodonero* (Span.); *Gossypium* sp. (*Malvaceæ*).

Mandiyú-rá (Guar.); *Ipomœa* sp. (*Convolvulaceæ*).

Mandió (Guar.), *Mandioca* (Span.); *Manihot Aipi* Pohl, and *M. utilissima* Pohl. (*Euphorbiaceæ*). The species most generally cultivated in Paraguay is the Sweet Mandioca (*M. Aipi*), which may be eaten simply roasted or boiled like potatoes, or by animals in the raw state. The wild mandioca (*M. utilissima*) is cultivated for the

extraction of the starch, which it produces more plentifully than the first-named species. Sweet mandioca is one of the principal aliments of the country.

Mangueró-mí (Guar.), *Yerba de Santa Lucia* (Span.); *Commelina cœlestis* Willd. (*Commelineæ*). A small plant employed in inflammatory diseases of the eye.

Mbocayí-saité (Guar.), *Lino silvestre* (Span.).

(*To be continued.*)

ON THE MANNA OF SINAÏ, AND THE MANNA OF SYRIA.

BY M. BERTHELOT.

'They took their journey from Elim, and all the congregation of the children of Israel came unto the wilderness of Sin, which is between Elim and Sinaï. . . . And the whole congregation of the children of Israel murmured against Moses and Aaron; and the children of Israel said unto them . . . Why have ye brought us forth into this wilderness, to kill this whole assembly with hunger? Then said the Lord unto Moses: Behold I will rain bread from heaven for you. . . . And behold upon the face of the wilderness there lay a small round thing, as small as the hoar frost on the ground. And when the children of Israel saw it, they said one to another: *Manhu?* which signifies: What is it? . . . And the house of Israel called the name thereof Manna. . . . The taste of it was like honey. . . . And the children of Israel did eat Manna forty years. . . . They did eat Manna, until they came to the borders of the land of Canaan."—*Liber Exodi.*, cap. xvi.

What is the substance described in the preceding recital, which figures so much in the history of the Hebrew nation, and the name of which serves as a type of a multitude of natural sugary substances? Can it be likened to any saccharine matter known in the present day? This is a very controverted question.* Two principal opinions are current on this point: the one regards manna as a sugary exudation supplied by various shrubs, principally by the *Alhagi Maurorum* (Tourn.), a kind of saintfoin; the other opinion likens the manna of the Hebrews to a species of cryptogamous plant. In these days the origin of the manna gathered at Sinaï may be regarded as settled, according to the researches made upon the spot by MM. Ehrenberg and Hemprich.† "Manna," says Ehrenberg, "is found at the present time in the mountains of Sinaï; it falls upon the earth from the regions of the air (that is to say, from the top of a shrub, and not from the heavens). The Arabs call it *Man*. The indigenous Arabs and the Greek monks collect it,‡ and eat it with bread in the same way as honey. I have seen it fall from the tree, I have gathered it, brought it myself to Berlin with the plant and the remains of the insect." This manna flows from the *Tamarix mannifera* (Ehr.). Like a number of other mannas, it is produced under the influence of the puncture of an insect, the *Coccus manniparus* (H. and Ehr.).

If the origin of the Sinaï manna be thus established, it is not so with its chemical nature. And this is a subject the more interesting, because the chemical analysis can alone explain its character as a nutritive agent. The result of my researches among sugary substances has led me to make some experiments in this respect. I have operated upon the following substances, the one identical with, the other analogous to, the manna of Sinaï:—1st. The Manna of Sinaï; 2ndly, The Manna of Syria, or rather of Kurdistan.

1st. The Manna of Sinaï.

The specimen was given to me by M. Decaisne; it was produced from the *Tamarix mannifera;* it had been gathered and brought home by M. Leclerc, who accompanied the Princes of Orleans in a voyage to the East (1859-1860).

This manna presents the appearance of a yellowish syrup, thick, and containing vegetable remains. It contains cane sugar, interverted sugar, dextrine, and water. The weight of the water was about a fifth of that of the whole mass. Its composition, after the removal of the water and vegetable remains, was as follows:—

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* Virey, *Journal de Pharm.*, 2e s., iv., 120 (1818), and Guibourt, *Hist. Natur. des Drogue Simples*, ii., 534 (1849).

† *Symbolæ Physicæ, etc., Zoologica*, ii., Insecta x., art. *Coccus manniparus.*

‡ The latter pretend that it falls only on the roof of their convent.

Cane sugar	55
Interverted sugar (levulose and glucose)	25
Dextrine and analogous substances	20
	100

2nd. Manna of Kurdistan.

The specimen was given to me by M. L. Soubeiran; it had been sent to Paris by Dr. Gaillardot. It had been gathered on the mountains of Kurdistan, to the N.E. of Mossoul. Subjoined is the information on this subject in a letter addressed to M. Gaillardot by M. Barré de Lancy, then Chancellor to the Consulate of France at Mossoul. This manna "falls without distinction on every plant in July and August, but not every year; there has been very little for the last three years. It is gathered by cutting the branches, which are left to dry for two or three days in the sun, when they are shaken, and the manna is obtained, which falls like dust. The Kurds use it without purifying it. They mix it with dough, and even with meat."* The matter presents itself under the form of a pasty mass, almost solid, impregnated with vegetable matter, and especially with the leaves of the nut-gall tree. It contains cane sugar, interverted sugar, dextrine, water, and, lastly, a small quantity of green waxy matter. This is the composition of the part soluble in water:—

Cane sugar	61.
Interverted sugar (levulose and glucose)	16.5
Dextrine and analogous substances	22.5
	100.0

From the preceding results, we see that the manna of Sinaï and that of Kurdistan are essentially composed of cane sugar, dextrine, and the products of the alteration, without doubt, of these two principles. Their composition is almost identical, a result the more singular, because the plants which produce these two mannas belong to two extremely different species. Nevertheless, this phenomenon is not without analogy. Thus we know, that the honey gathered by bees from very different flowers possesses a composition almost identical. This is not the only comparison which may be made between honey and the mannas in question. Not only do insects concur equally in the formation of honey and that of the manna of Sinaï, but further, this manna, as well as honey, is composed of cane sugar and interverted sugar; the manna of Sinaï contains beyond this, dextrine, and the products of its alteration.

If we return now to the historical recital of the manna of Sinaï, it is easy to explain the use of this substance as a food. In short, it is a true honey, perfected by the presence of dextrine. We see, at the same time, that the manna of Sinaï does not suffice as an aliment, since it does not contain any nitrogenous principle. Therefore, animal food is associated with it, as well in the actual usage of the Kurds as in the biblical narrative.—See Exodus, xvi., 8—13.—*Comptes Rendus.*

THE ADULTERATION OF MUSK, AND THE METHODS OF EXAMINING THE SAME.

BY PROF. W. BERNATZIK.

Musk in substance is examined by crushing, pulverizing, microscopical inspection and microchemical investigation. The more important agents used in chemical examination are: rectified oil of turpentine, glycerin, potash-lye, and nitric acid, containing some nitrous acid.

A very small amount of musk, mixed with a few drops of oil of turpentine or glycerin, and heated for a short time, appears, when cold again, under the microscope, in the form of cloddy globules of a yellow (where accumulated, brownish) colour, and is thus readily distinguished from powdered coal and other admixtures. Where the character of one or the other globule remains doubtful, a fresh portion of musk is heated with a few drops of a solution of potash. The dissolved light-brown

* This information agrees with that of Virey.

substance presents under the microscope innumerable fat-globules of different size. Ammonia has a similar effect.

Nitric acid, mixed with musk and slightly heated, produces vapours, presenting the smell of musk and nitrous acid, and changes the musk to a light brown, soft, resinous mass, which turns into a brownish cloudy fluid under the addition of a little more acid. Appearance under the microscope same as before described. The addition of water produces a copious yellowish-red sediment, which is soluble in solution of potash.

Concentrated sulphuric, muriatic, acetic acids show no influence on musk in common temperature. Aided by heat, sulphuric acid produces a dirty brown frothy solution, which after a while turns turbid and blackish. The other acids named induce, even with heat, no great alteration, beyond vapours corresponding to the acid, swelling of the globules, and coloration of the acid, without perceivable solution. Similar is the action of iodide of potassium combined with iodine.

If admixtures are discovered, they should be isolated by treating the mass with diluent agents, especially cold or hot water, or by cautious flowing.

Musk that has been subjected to extraction (for perfumery purposes, &c.) is frequently used to adulterate the officinal article. This can be detected by dissolving the suspicious mass in different fluids. Hot water dissolves only fifty-five per cent. of well dried musk. A solution of it in twenty parts of water is red-brown, somewhat thick, not easily filtered, of acid reaction, not disturbed by ether or alcohol. All mineral and organic acids produce a dirty brown sediment, leaving the solution of a yellowish-red colour. A similar effect is shown by acetate of lead, the oxides of iron, muriate of tin, the nitrates of mercury and silver, sulphate of copper, chloride of platinum, sulphate of alumina, common alum and muriate of baryta. Chloride of mercury does not disturb the fluid; potassa, soda, and the alkaline carbonates impart to it a darker colour; ammonia and lime water cause a slight disturbance; tannic acid and many organic, especially animal, substances do that only when added in excess. Absolute alcohol dissolves musk not to the same extent as water, repeated extraction leaving 75 per cent. of a grey-coloured, slightly brownish mass. The solution is of a yellowish-white and somewhat red colour, with a fine white flaky sediment. Addition of water only affects it when resinous or fatty substances are present. Diluted alcohol dissolves musk the more readily the more water it contains. Ether and chloroform possess hardly any dissolving power.

Adulterations with dried blood, animal coal, vegetable extracts, adipose substances, resins, asphaltum, stone coal, coffee sediments, &c., are recognized by the difference in the changes produced under the influence of other agents; desiccated blood, for instance, being not very soluble in water, &c.

It may be necessary to reduce the suspected substance to ashes. Burning musk smells like burnt extract of urine. It leaves about five per cent. of greyish-white, here and there yellowish or pale red ashes, containing potash, lime, magnesia, iron, carbonic, phosphoric, and sulphuric acids, chlorine, traces of ferrocyanate of potassa and sulphuret of ammonium. Blood leaves 8.5 per cent. of red-brown ashes; other admixtures only a very small per-centage.

Musk sold without pouches seems to be extensively mixed with inferior sorts—an adulteration which cannot be detected. Probably the mass remaining after extraction by alcohol is frequently used for the same purpose. Pouches that have been punctured and macerated in alcohol, are recognized by their shrivelled, knotty appearance. The residue left in the preparation of the officinal tinctures is possibly also sold for pure musk. Moistening is frequently resorted to, for the purposes of increasing the weight. Every specimen which loses much in weight by drying should be rejected, for genuine musk, even if kept as dry as possible, has rather a tendency to increase somewhat in weight.

Pieces of lead or iron, small shot, stones, portions of tendons, leather, paper, and artificial musk are frequently added to, or substituted for, a part of the contents of the pouches. Sutures and other occlusions appear after moistening the pouches by wrapping them in wet blotting-paper.

Artificial pouches—Wampo-musk—never show the proper anatomical conditions: the genital opening, penis, &c., are wanting, and the heterogeneous composing parts are readily discernible.—*Zeitschr. d. Gesellsch. d. Aerzte zu Wien*, and *American Journal of Pharmacy.*

ON THE ANTAGONISTIC EFFECTS OF OPIUM AND QUININE

BY DR. NIVISON.

Dr. Nivison's attention was drawn to this subject by the assertion of M. Gübler that these substances ought never to be administered together, so antagonistic are they in their action. Dr. Nivison maintains that this antagonism only influences the bad effects of these substances, and enables us to prescribe them simultaneously with advantage under circumstances when they could not otherwise be given. Some of these he enumerates:—1. Many acute inflammatory conditions will promptly yield to the influence of full doses of opium, but such doses cannot be given without the risk of so far paralyzing the nervous energies as to induce fatal congestions. Quinine, however, pre-eminently possesses the power of giving contractile action to the capillaries, and thus overcoming contraction; and experience has shown that if the proper amount be combined with opium in these cases, a sufficient quantity of the latter may be safely given. 2. A frequent objection to the free use of opium is its tendency so far to reduce the biliary and renal secretions as to incur the risk of fatal toxæmia. Combined with quinine, this tendency is, to a great extent, counteracted. 3. Opium frequently reduces the respiratory action so that the blood becomes imperfectly aërated—an effect obviated by the addition of quinine. 4. The notoriously unpleasant after-effects of opium do not usually appear when it is given with quinine. 5. In cases of extreme exhaustion the free use of opium is the sheet-anchor; and in the reduced state of the sensibilities of the system the extent of its toleration is astonishing. Under these circumstances, however, it not infrequently happens that the quantity which is barely enough to produce the reaction, is not sufficient when this does occur to produce unpleasant narcotism. By the addition of quinine the desired action is secured with a less amount of opium, while the more protracted operation of the quinine will enable us to maintain the reaction for any desired length of time, without those frequent repetitions of the opium that otherwise would be necessary. So, too, persons in a state of narcotism from overdoses of opium may be often promptly roused by a full dose of quinine. This is especially the case in young children, who usually tolerate opiates very badly. 6. A large proportion of the persons who, in consequence of their idiosyncrasy, cannot take opium, are enabled to do so when it is combined with quinine.

On the other hand, certain well-known effects of quinine are often desirable, where, from peculiarity of circumstances, we either cannot obtain them, or, doing so, we bring with them such an undesirable train of concomitants, that we are forced to dispense with it. Thus: 1. The prominent feature of many diseases is dangerous *congestion* of some internal organ, for relief of which the contractile action of quinine on the capillaries is very desirable; but we find on trial that by it we only impart a peculiar *excited* action to the general circulation, under the influence of which the congestion is aggravated rather than relieved. The addition of a sufficient quantity of opium to control this excitement, will not only ensure the action of the quinine on the capillaries, but by diverting the general circulation to the surface, aids still further in overcoming the congestion. In this class of cases either opium or quinine, acting alone, would almost certainly add to the existing congestion; in combination the bad effects are neutralized, and the two remedies co-operate in producing the desired relief. 2. There are many forms of *inflammation*, to which, *mutatis mutandis*, the above remarks will apply with equal force. Judicious combinations of these remedies will often give us the most perfect control of the vital forces, and enable us to fulfil the various indications in the most satisfactory manner. Valuable information on these points may be found in the *Dublin Hospital Gazette*, July, 1856, and *Dublin Journal*, August, 1856. 3. Quinine and opium may often be employed most advantageously in combating various disturbing symptoms in *fevers*. 4. There are various affections usually termed *neuralgic*, which are palliated by opiates, and sometimes cured by quinine. These cases will often yield more speedily to the combined influence of opium and quinine than to any other known remedies. 5. There are numerous morbid conditions belonging to the *neuroses*, often associated with anæmic states of the system, where the true etiology of the disease can doubtless be traced to *defective nerve-nutrition*. We have already had occasion to notice the action

of both opium and quinine in modifying and improving the function of nutrition. In the present state of our knowledge, there is nothing that would preclude the idea that this improved nutritive action may extend to the nerve-tissue. But whatever the *rationale*, the fact remains, that very many of these neuropathic conditions will yield to the combined action of these remedies.—*American Journal of Medical Science*, July, pp. 51—58.—*Medical Times and Gazette.*

ON THE CONVERSION OF MONOHYDRATED INTO COMMON PHOSPHORIC ACID.

BY J. M. MAISCH.

Since the investigations of Graham into the nature of phosphoric acid, and his important discovery of the three hydrates, which form three corresponding series of salts, no further researches appear to have been instituted. The standard works on chemistry contain scarcely anything beyond an abstract of the statements made by Graham about thirty years ago, and thus it happens that we know very little yet about the transition of one hydrate into another one. Starting with the phosphate of lime in bones and the common phosphate of soda, the pyrophosphate of soda and metaphosphoric acid have undoubtedly been often the subjects of experiments. What is known, however, of the reconversion of meta- and pyrophosphoric acid into the ordinary tribasic acid, is contained in the following paragraph of *Graham's Elements of Chemistry*:—When solutions of the metaphosphate and pyrophosphate of water are warmed, they pass gradually into the state of common phosphate, combining with an additional quantity of water; and the metaphosphate of water appears then to become at once common phosphate without passing through the intermediate state of hydration of the pyrophosphate. Otto says, that on boiling the solution of metaphosphoric acid, it is very rapidly converted into the common acid, without, it seems, previously forming the deutohydrate.

The glacial phosphoric acid consists chiefly of HO,PO_5, to obtain from it the ordinary acid, would appear to require merely to warm or boil its aqueous solution. On making the experiment, however, it will not be found so easy as supposed. The committee having charge of the final revision of the Pharmacopœia, experienced this difficulty and handed the subject over to me for investigation.

It is well known that the monobasic acid produces gelatinous precipitates in the solutions of most metallic oxides, coagulates albumen, and after neutralization, yields with nitrate of silver a white precipitate; the deutohydrate resembles the former only by precipitating silver salts white after it has been previously neutralized; the terhydrate under the same circumstance, yields a yellow precipitate. For the following experiments, Merck's glacial phosphoric acid was employed, and care taken to select pieces perfectly transparent and free from earths and other acids.

If some of this glacial phosphoric acid is thrown into cold water, it is slowly dissolved, and the solution shows the above reactions of the monohydrated acid; set aside at our summer temperature for two or three weeks, the solution ceases to coagulate albumen, and yields now a purely yellow coloured precipitate with salts of silver. The acid has been converted into the terhydrated, and apparently without becoming first the deutohydrate; for, in proportion to the decrease of the coagulation the yellow colour of the precipitate becomes more apparent. The change is not brought about suddenly, but gradually; and similar is the behaviour of the deutohydrate; dissolved in water, it is gradually converted into the terhydrate. It is very probable that the bulk of the solution and its density, that is the concentration of the solution, may have a marked influence on the time requisite for forming the terhydrate, as I shall show in another place, but my experiments were not extended so far.

When a strong solution of metaphosphoric acid in water is heated to the boiling point, and the boiling continued with the precaution to condense the evaporating water or most of it in the retort, so that the solution may at no time assume a syrupy consistence, it will be found that the bulk of the precipitate produced in a solution of albumen will gradually lessen, and after an hour or two, according to the amount operated with, will cease entirely; but now and at all times during the

ebullition, the liquid, neutralized with soda or ammonia, produces a white precipitate with nitrate of silver, free from any tinge of yellow. The solution, it appears, contains pyrophosporic acid, and is not perceptibly changed on continuing to boil for several hours more.

The syrupy liquid contained in bottles filled with glacial phosphoric acid, after having absorbed some moisture, consists at first of the mono- and deutohydrate, dissolved in water; heated to boiling, it changes very slowly into the bibasic acid. As the conversion proceeded much slower than in the former instance, experiments were made with a very dilute solution.

This diluted solution, containing about a drachm of the glacial acid in 8 or 10 fluid ounces of water, was heated to boiling and kept at this temperature; in about twenty minutes it had lost the property of coagulating albumen; but previous to this, the precipitate with silver was perceptibly yellow, though not quite as deep coloured as from the common phosphate of soda.

This precipitate had not become of a deeper yellow after the liquid ceased to coagulate albumen, and if the boiling was continued for several hours, little change could be perceived. It was evident that the solution contained some terhydrate and deutohydrate mixed. Experiments were now made with the same solutions, the strong, syrupy, and dilute, at temperatures between 110 and 200° F. In all instances the result was similar to that just described, with the exception that generally a longer time was required to alter the monohydrate, the lower the temperature was to which the solution was exposed. Now, too, strong solutions afforded no evidence of the presence of the terhydrate after the monohydrate had disappeared, while the weak solution, on the contrary, contained terhydrate, as was shown by the colour of its silver precipitate.

If phosphorus is oxidized by nitric acid, the solution contains common phosphoric acid, which, after evaporation, may by heat be converted into the deuto- and monohydrate. If the monohydrate is now dissolved in diluted nitric acid and heated, it will lose its property of coagulating albumen, and will produce a yellow precipitate with silver salts, identical in colour with that obtained from the common phosphate of soda. This change in the presence of nitric acid does not appear to be unaffected by the density of the solution; but, as before, a more dilute solution is more readily converted into the tribasic acid than a concentrated one, and apparently without the previous production of the bibasic acid.

At first, I supposed that the metaphosphoric acid contained some compound requiring oxidation, before the change could be effected, but a careful trial showed the absence of any nitrous acid vapours by the time the conversion was complete.

It is likewise not the presence of another mineral acid which effects the change of the mono- into the terhydrate; for when boiled with hydrochloric acid, the solutions scarcely yield more of the terhydrate than is obtained by the aqueous solution alone, while pyrophosphoric acid remains mixed with it, and an addition of common phosphoric acid does not exert any influence on the solution provided it be perfectly free from nitric acid.

That the cause cannot be looked for in the higher temperature, necessariily produced by the addition of nitric acid, is evidenced by the facts that the more concentrated solutions of the glacial phosphoric acid yield no terhydrate by boiling, while the diluted solutions boiling at a lower temperature, yield some, and that after the addition of nitric acid, the liquid need be but heated to near its boiling point to effect the change completely though more slowly than by boiling. The density of the solution, as will be seen by the above statements, exerts a strong influence in this process; but nitric acid converts both concentrated and diluted solutions into the common phosphoric acid.

It will require more and very careful experiments to determine precisely the way in which nitric acid acts in this case. That nitric acid merely acts as a catalytic agent, seems probable, from the absence of nitrous acid vapours; but it might be possible that a compound between metaphosphoric and nitric acid is formed for a short time, and decomposed again into nitric acid and the common phosphoric acid; or the monohydrated acid might be oxidized to a still unknown oxide, PO_6 or PO_7, which is instantly decomposed into common phosphoric acid and oxygen, the latter in its nascent state uniting with NO_4 or NO_3 to form nitric acid again. Certain it

is, that a small quantity of nitric acid will, with proper precaution to prevent its evaporation, change a considerable amount of metaphosphoric acid; and it acts quite or nearly as quickly upon the pyrophosphoric acid.

Graham, though he does not state so, undoubtedly operated with diluted solutions of metaphosphoric acid, by which his statement above quoted will be partly explained, and the entire conversion into the terhydrate is merely an oversight, as a partial change only takes place. It is self-evident, that if a portion is thus altered, there ought to be a possibility of altering the whole in a like manner; the difficulty appears to consist in placing the entire solution in the same favourable condition, which is the proper large amount of water, and probably a certain temperature, which when at the boiling point, induces the change most rapidly. If the proper conditions are ascertained, we may perhaps succeed in converting the entire bulk of a solution into the terhydrated acid; but an important point must be to prevent the formation of the deutohydrate, which, it appears to me, offers under all circumstances more resistnace to form the terhydrate, than the pure monohydrate. Both, however, when in solution, succumb to the influence of time and of nitric acid, assisted by heat.

Of the behaviour of the three hydrates in their free and combined state to reagents we still know too little, though it is an important and at the same time an interesting subject for further researches.—*American Journal of Pharmacy.*

NOTES ON KITTOOL FIBRE.

BY P. L. SIMMONDS, F.S.S.

Among the comparatively recent additions to our commercial imports is the kittool fibre, received exclusively at present from the Island of Ceylon, which has now become a recognized trade article.

Messrs. Armitage Brothers and Co., of Colombo, were the first merchants who shipped the kittool fibre to this country, about the time of the Russian war, when so great an inquiry arose for all kinds of fibrous materials and substitutes for bristles; and it has since held its ground in public favour, in common with the Sisal hemp, or Mexican grass, as it was termed, obtained from the *Agave Sisalana*, introduced for brush-making about the same time. Messrs Darby, Butler, and Co., of Colombo, also now ship kittool largely. It comes home tied up in small bundles packed in gunny-bags, weighing about 28lbs. each. The fibre averages about 30 inches in length.

The lofty *Caryota* palm, which furnishes this fibre, is one of the largest and most charming of this beautiful tribe. It has a straight trunk, from 40 to 60 feet high.

In Ceylon the tree is called keetul, whence the corrupted name of kittool given to the imported fibre. On the continent of India it is known under the various names of Coonda-panna (Tam.); Erim-pana (Mal.); Teeroogoo (Tel.); Ramguoah, Bonk-hejur, and Bura-flawar.

This palm is a native of the jungles of Malabar, Bengal, Assam, and various other parts of India, where it often grows with teak and wild mango trees. In Ceylon it is found in the south-western and Kandyan provinces. Humboldt has justly remarked, that the form of the leaf of *Caryota* is as singular among palms as that of the Gingko (*Salisburia adiantifolia*, Smith) is among *Coniferæ*. This singularity consists not only in the leaves being bipinnatisect, but also in their ultimate division, having the shape of the fin and tail of a fish; features so peculiar, that by means of it the genus *Caryota* may at once be distinguished from all other palms. The leaves are very largel measuring 18 or 20 feet in length, and from 10 to 12 across. They are attached to a strong skin as hard as a board, but full of fibres which are used as thread and made into cordage. Brushes, brooms, baskets, caps, and similar articles are manufactured of it. From the peculiar odour attaching to the kittool fibre on importation, it would seem to be steeped in cocoa-nut oil to darken it, and to make it more pliable and less brittle.

Within the last four years, large imports of the brown fibre in the natural state have been made; and it is steeped in rape-oil in this country to darken it and improve the quality. The strong brushes made with kittool are found well adapted for sweeping butchers' chopping-blocks, brewers' hogsheads, and such-like purposes.

Major Heber Drury, in his work on *The Useful Plants of India*, states that "a fibre prepared from this palm is used for fishing-lines and bow-strings, which is the Indian gut of the English market. It is strong and durable, and will resist for a long time the action of water, but is liable to snap if suddenly bent or knotted."

In some *Observations on the Vegetable Products of Ceylon*, by my friend, Mr. W. C. Ondaatje, surgeon, of Colombo, with a copy of which he has favoured me, he states that the black fibre from the leafstalks of the kittool is manufactured into rope, which is of great strength and durability, being used for tying wild elephants. The Rodyahs, or outcasts among the Kandyans, make this rope, generally with considerable skill, as it is both regular and compact. There is also a woolly material found in the petioles or base of the leaves, which is stated to be sometimes used for caulking ships. The leaves keep falling off as long as the tree continues to grow; but when it has attained its full growth, they adhere for many years to the stem, and no fresh ones are produced.

In Ceylon there are three varieties of kittool-gaha, the principal species of the palm (*Caryota urens*). The other two species of the genus, katu-kittool (*C. horrida*), and Do-talu (*C. mitis*), are also met with; but whether these furnish any of the kittool fibre of commerce, we have no definite information.

The kittool palm yields an uncommonly sweet sap of very pleasant taste and wholesome qualities. During the hot season, a single tree will often yield at the rate of fifty quarts of palm-wine in the twenty-four hours. From this juice, after boiling, a brown sugar called jaggery is prepared; and when particular care is used, it is scarcely inferior to white. The pith or farinaceous part of the trunk of old trees affords an article nearly as good as the ordinary sago of commerce, which is used in Assam as such. The natives make it into bread, and boil it into thick gruel. In Ceylon there is a distinct caste of natives, the Jaggeraroos, who take the name from all, male and female, being employed in the culture of the tree itself, or in the manufacture of the coarse sugar (jaggery) procured from it.

The split trunks of the kittool palm are used for rafters and window-bars, and are found very hard and durable. The seeds are used by Mahomedans as beads.—*The Technologist.*

ON THE HISTORY OF THE ALKALI MANUFACTURE.

BY MR. GOSSAGE.

(*Read before the British Association.*)

It was correct, he believed, that the manufacture of soda in Great Britain, by the special decomposition of common salt, had its commencement in Lancashire; at any rate, its largest development had taken place in this county. Previously to the establishment of the French republic, in 1793, soda was obtained almost entirely from the ashes of marine plants growing at Alicante, in Spain, Sicily, Teneriffe, and on the coast of Great Britain. Large quantities of potash were also imported from Russia and America, but now soda was exported to those countries which formerly sent us potash. The importation into France of alkali being stopped by the French Revolution, a committee was appointed by the French Convention to discover means of supplying the article from France alone. The process suggested by Le Blanc was approved of, but it was erroneous to suppose that his process was not invented till the committee was appointed. Having given an account of Le Blanc's invention, Mr. Gossage said that it was very complete, and was the same as now used in both England and France. This invention had done more to promote civilization than any other chemical manufacture. The poor inventor, however, met with the too common reward of talent, and, after great privations, died in an asylum for paupers. Sundry alkali works were erected in France, but the process was not introduced into England for some years afterwards. In 1787, Messrs. Gordon, Barrow, and Co., of Aberdeen, applied chlorine, then recently discovered, to the process of bleaching. A large establishment was, in the following year, established at Bolton. At first, chlorine was used in the state of solution in water, but the inconvenience of using it in that manner was overcome by the addition of potash to the water. The next step was to substitute lime for potash, producing solution of

chloride of lime. This was the invention of Mr. Charles Tennant, of St. Rollox, who afterwards manufactured chloride of lime in the state of powder. This manufacture was carried out to a great extent. A great obstruction to the manufacture, however, was the high excise duty on salt, which operated most injuriously. When Mr. Tennant's patent for manufacturing bleaching powder expired, other parties began the same manufacture. Attention was directed to the utilization of the mixed sulphate of soda and sulphate of manganese resulting from this manufacture, and carbonate of soda in crystals was gradually introduced into the market. During the same period Mr. Losh was making crystals of soda, and might be considered the father of the soda trade in this country. Mr. Losh finished his education on the Continent, where he learned Le Blanc's processes. After his return he obtained permission of Government to work a spring of weak brine discovered at Walker, on the Tyne, for the manufacture of soda. He there manufactured soda crystals; but, notwithstanding these essays, 1823 might be considered the natal year of the soda trade as a special manufacture in Great Britain. In that year, common salt being relieved from fiscal impost, Mr. James Muspratt commenced the manufacture of sulphate of soda at Liverpool, to be used for the manufacture of carbonate of soda. Mr. Muspratt adapted Le Blanc's processes in their entirety. He had to contend with many difficulties, but he overcame them all, and reaped a satisfactory reward. Other manufacturers also commenced to make sulphate of soda, by the special decomposition of common salt, for the purpose of making soda; and it had since been found advantageous to adapt this method of working to the production of bleaching powder, by using the hydrochloric acid so obtained to generate chlorine by its action on manganese. In the early days of the soda trade, no attempt was made to condense and liberate hydrochloric acid gas. The old apparatus of cylinders and Wolfe's bottles were totally inadequate for the condensing. Many plans were suggested, and amongst others he (Mr. Gossage) obtained a patent in 1836. Having demonstrated the practicability of effecting a complete condensation of hydrochloric acid, by the erection and working of a set of apparatus at the soda works with which he was then connected, he introduced the plan to the trade, and it had been subsequently adopted by every manufacturer. The principle of the invention consisted in causing the acid gas to percolate through a deep bed of coke, in small lumps contained in a high tower, at the same time that a supply of water flowed very slowly over the surfaces of the pieces of coke. By this means, an almost unlimited extent of moistened surfaces might be presented to the gas for effecting its absorption, and as the same fluid descended through the tower, it met with more gas, and gradually became charged to saturation; whilst, at the upper portion of the tower, any gas which might otherwise escape was exposed to the absorbing power of unacidulated water. In 1838, a French house, Messrs. Fai and Co., of Marseilles, obtained a monopoly from the King of Sicily for the export of sulphur. This caused an advance in price to £14 per ton from the previous rate of £5 per ton. It was soon found that in our Cornish mines, and in those of Wicklow, in Ireland, we possessed an inexhaustible supply of sulphur in the form of pyrites; our practical chemists soon availed themselves of this source for the manufacture of sulphuric acid. In working with pyrites, it was found that this mineral contained sulphide of copper, as well as sulphide of iron, and, at an early period, he commenced to extract the copper from the burned residuum by smelting. At the present time, the products obtained by the soda manufacturers were soda ash, worth £3 per ton; soda crystals, about £4 10*s.* per ton; bleaching powder, £9 per ton; bicarbonate of soda, £10 per ton; whilst the cost of raw materials, now used in Lancashire, are sulphur, £8 per ton, for which was substituted pyrites at a cost equivalent to £5 per ton; sulphur salt, 8*s.*; zincstone, 6*s.* 8*d.*; fuel, 6*s.* per ton. Thus, with a reduction in the cost of raw materials not more than equal to 10 per cent., the public was supplied with the products of the soda manufacturer at a reduction of at least 60 per cent. As nearly as he could obtain information, there were fifty establishments in Great Britain, in which soda was manufactured by Le Blanc's process, producing about 3000 tons of soda ash, 2000 tons of soda crystal, 250 tons of bicarbonate of soda, and 400 tons of bleaching powder per week. The total amount of these products might be estimated as exceeding two millions sterling, which was so much entirely added to the annual income of the country, excepting about one

hundred thousand pounds paid for materials obtained from other countries. He must not omit to notice the prospect of a new market for British-made soda which had been opened by the successful labours of Mr. Cobden, in negotiating the commercial treaty with the French Government. Many attempts had been made to supersede Le Blanc's process by some more direct means of operating on salt, so as to eliminate its soda at once. Up to the present time, the result of all these attempts had been the wasteful expenditure of large sums of money. Two-fifths of the total cost for raw materials was incurred for pyrites, from which to produce a supply of sulphur; and it was a well-known fact that more than nine-tenths of this sulphur was retained in the material called "alkali waste," which was thrown away by the manufacturer. Thus was presented a problem which, if it could be solved, would effect a large reduction in the cost of soda. Many chemists, both scientific and practical, had given a great amount of attention to that subject. He had been so unfortunate as to be amongst the number, as he had devoted a great proportion of his time during a quarter of a century, and a large amount of both money and labour to this hitherto delusive subject. He commenced by demonstrating, in 1838, that one equivalent of sulphide of calcium produced monocarbonate of lime and sulphide of hydrogen. This decomposition was contrary to the received views of scientific chemists of that day, as it was held that an excess of carbonic acid was needful to effect the perfect decomposition of sulphides. He was convinced that whenever the utilization of the sulphur in alkali waste might be effected, it would be by means of this action of carbonic acid. He demonstrated also, at the same time, that one equivalent of carbonic acid would decompose one equivalent of sulphide of sodium, producing monocarbonate of soda and sulphide of hydrogen. His present impression was, that Le Blanc's process would be modified by the omission of lime, when decomposing sulphate of soda, thus producing sulphide of sodium; and that the carbonic acid evolved by this decomposition would be applied to decompose the sulphate of sodium, producing carbonate of soda, and eliminating sulphide of hydrogen, which would be absorbed by peroxide of iron, and the product in the manufacture of sulphuric acid. He had proved the practicability of all those decompositions and actions; but the ideas had still to be worked into a practical operation.

ON THE ACTION OF WATER ON LEAD.

BY DR. F. CRACE CALVERT, F.R.S.

(Read before the British Association.)

I would not have troubled this Section with bringing before them a subject which has been noticed by them several times already, if these researches (which were made in connexion with a Select Committee of the Sanitary Association of this city) had not presented some interest on several points—namely, the action on lead of a water supplied to a large population; the determination of the quantity of lead that the same water took up in a given length of time; and, further with the hope of removing from the minds of some chemists the impression that soft surface water does not act upon lead.

These experiments have extended over a period of more than twelve months, and above 300 samples of water have been tested, and led to the following conclusions:—

First, that the water supplied to Manchester, and passing through a lead pipe used as a supply pipe, was for four days highly charged with lead compounds, and that the quantity gradually decreased for six weeks, when the water ceased to absorb lead. But if, during that period, the water were allowed to remain in contact with the pipe for twelve hours, its action was still very marked, and it may be stated that, at the end of six weeks, the water still contained 2-10ths of a grain of lead per gallon, and after three months 1-30th of a grain was found.

Secondly, experiments were made on five samples of piping of the following description:—No. 1, extra tinned lead piping; No. 2, ordinary tinned lead piping; No. 3, best or virgin lead piping; No. 4, common lead piping; No. 5, block tin piping. The water was left in contact with these pipes for twelve hours, and, with

the exception of the one last mentioned, all were acted on, the proportion of lead taken up by the water from the lead pipes amounting to from 1-10th to 3-10ths of a grain per gallon. Waters containing these quantities of lead per gallon are quite sufficiently charged with that compound to prove injurious to health if used as a beverage. I may substantiate this statement by the fact that four samples of water, which I have lately examined as having injured the health of the inhabitants of this city, contained from 1-10th to 3-10ths of a grain of lead per gallon. Therefore, there can remain no doubt that the water of this city may become sufficiently charged with lead to injure the health of the inhabitants.

Dr. Crace Calvert concluded his remarks by stating that, on allowing water to remain for some time in the pipes, and then again bringing them into constant use, the action of the water on the pipes is greatly increased.

ON THE PROPERTIES OF SULPHATE OF ANILINE.

(Read before the British Association.)

Dr. Turnbull, of Liverpool, read a paper "On the Properties of Sulphate of Aniline"—a new remedy which he had used with success in the treatment of chorea, or St. Vitus's dance. He said that medical men had not acquired a knowledge of the properties of new remedies commensurate with the advances which had been made in other branches of medicine. The progress of organic chemistry had brought to light many new bodies worthy of investigation; and there could be little doubt that many of them would, if their properties were investigated, be found to prove remedies of utility. The artificial alkaloids were a numerous class, and from their resemblance in chemical constitution to the vegetable alkaloids, such as quinine, morphia, &c., it might reasonably be expected that some of them should have powerful and useful properties. He had made some trials of more than one of them, and especially of the sulphate of the artificial alkaloid aniline, which he had administered in cases of nervous disorder. He then proceeded to give an account of six cases of chorea which he had treated successfully with this new remedy. The first was the case of a girl aged thirteen, who had involuntary twitching movements in all the limbs, and was for two months under the usual treatment, but without deriving the slightest benefit till the sulphate of aniline was given. She then recovered rapidly and got quite well. The second was a case in which the left side was chiefly affected, and the recovery was perfect in twenty-one days. The third was a case in which the twitching movements were brought on by a fright, and the recovery took place in fourteen days. The fourth and fifth were cases of recovery from the ordinary form of the disease. The sixth was a case of unusual severity, with partial loss of power of the lower limbs and inability to speak. Rapid and perfect recovery was, however, effected in this case by means of the same remedy. He adverted to two other cases in which sulphate of aniline had been used with success by other medical men; and he expressed the conviction that it would be found by the profession to be a valuable new agent in the treatment of this class of nervous diseases. In regard to the physiological action, he stated that aniline appeared to act directly on the nervous system. The most remarkable effect, however, which it produced was a transient alteration in the colour of the skin and lips, which he attributed to oxidation of the aniline and the formation of a colouring matter in the blood. But this, it was observed, must be speedily eliminated from the system, as the natural colour was restored as soon as the remedy was laid aside.

The President (Dr. Davy), in proposing a vote of thanks to the author of the paper, drew attention to the physiological action; and in the discussion which ensued Dr. Moffatt and other gentlemen took part.

ON PERCHLORIC ACID AND ITS HYDRATES.

BY PROFESSOR ROSCOE.

(Read before the British Association.)

All the knowledge we possess of the quantitative relations of perchloric acid is the determination of the composition of the potassium salt, first analyzed by Stadion in 1816, and afterwards by many other chemists. The perchloric anhydride has not

been isolated, and no analysis of the aqueous acid has ever been made. We can only account for the neglect with which chemists have treated the highest and yet the most stable of the oxides of chlorine, by the fact that the preparation of the acid in large quantities has been attended with great difficulties. The best method for preparing aqueous perchloric acid is to decompose chlorate of potassium with hydrofluosilicic acid, to boil the chloric acid thus obtained down, which splits up into lower oxides of chlorine, which escape in the gaseous state, impure perchloric acid being left behind, which is purified by distillation. The acid thus obtained is in appearance not to be distinguished from oil of vitriol, being a colourless, heavy, thick, oily, corrosive liquid, giving off by heating dense white fumes. By heating the aqueous perchloric acid with four times its volume of concentrated sulphuric acid, the latter takes water from the first, dense white fumes are evolved, a yellow mobile liquid distils over, afterwards thick oily drops appear, which, when coming in contact with the yellow liquid, form white crystals, previously obtained by Serullas, but in such small quantities that he was unable to analyze that substance, which, prepared in this way, contain always sulphuric acid, and is therefore not fit for analysis, and requires re-distillation. Heated, however, to 110° C., the crystals decompose, and split up again in the yellow liquid, which distils over at a low temperature, and the thick oily liquid remains in the retort. The yellow liquid thus obtained is pure perchloric acid, a body not known before, and can be obtained also by distilling one atom of perchlorate of potassium with four atoms of sulphuric acid. In the pure state it is perfectly colourless, but commonly slightly yellow, owing to the presence of lower oxides of chlorine. Perchloric acid is one of the most powerful oxidizing agents known; a single drop brought into contact with charcoal, paper, wood, alcohol, &c., immediately causes explosive combustion, falling not short in violence of that of chloride of nitrogen, and brought on the skin fearful wounds are produced, which do not heal for months. Like nitric acid, it cannot be distilled without decomposition, but it darkens, and heated stronger, decomposes with explosion. It cannot be kept for any length of time; even sealed up in glass bulbs, which are placed in the dark, it decomposes suddenly after some time, smashing the vessel containing it. It mixes with water with a hissing noise and evolution of heat, uniting and forming the same crystals which were mentioned before, and were used for preparing the pure acid. Those crystals are the monohydrated perchloric acid. They melt at 50° C., and heated to 110° C., split up in pure perchloric acid, which distils over, and an oily liquid boiling at 200°, which is also obtained by boiling aqueous perchloric acid till dense white fumes are given off. That oily acid has a constant composition containing 72.3 per cent. pure perchloric acid and 27.7 per cent. of water. This per-centage corresponds, however, to no definite hydrate of simple atomic composition, but follows the same general relations respecting composition and boiling point, which, as I have shown previously hold good for so many aqueous acids, namely, that the phenomena of constant boiling point and constant composition depend chiefly upon physical, and not on chemical, attractions.

ON THE CAUSE AND TREATMENT OF THE POTATO DISEASE.

BY DR. A. DE BARY.

If the name of De Bary were not so well known both in this country and the Continent as that of a painstaking judicious observer far less given to theory or to merely transcendental views than the greater part of his compatriots, the pamphlet* which he has lately written on the potato disease would have quietly died in the birth, if the author escaped ridicule for approaching again a subject which could scarcely end in anything after all his labour better than the production of a "ridiculus mus." The brochure, however, contains a great deal that will repay more than a cursory perusal. He has not only passed in review, without a particle of prejudice, all that he has met with at all worthy of notice, but he has instituted a careful series of

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* Die gegenwärtig herrschende Kartoffelkrankheit, ihre Ursache, und ihre Verhütung. Von Dr. A. de Bary, Professor der Botanik zu Freiburg. Leipzig, 8vo, pp. 75, 1 tab. lith. 1861. On the Cause and Treatment of the Potato Disease, a popular Essay, by Dr. A. de Bary.

experiments, which place the particular view of the subject which he embraces in the most clear and convincing light. He has, moreover, added greatly to our knowledge of the peculiar parasite which uniformly precedes, and as he, in common with most authorities at the present day, believes is the immediate cause of the malady, and especially as regards its mode of reproduction and the limits within which its reproductive organs germinate.

It is not our intention to go again over the ground which has been so often traversed in this Journal. All attentive readers of our pages are acquainted with the external characters and habit of the parasite as described by its earlier observers, and we have already given some account in the *Agricultural Gazette* of this year, at page 486, of the curious discovery of De Bary relative to a third mode of propagation by means of zoospores,* and that apparently the most frequent. The spores themselves, under certain circumstances are undoubtedly capable of germination, but more frequently, when well supplied with water, instead of germinating they show at once signs of important changes in the granular matter which fills their cavity, which ends in the production of a number of reproductive bodies closely resembling many of the more minute infusoria, and moving about for a time with the utmost activity by means of two long lash-like appendages, one of which appears to be the organ of motion, and the other to act as a rudder for its regulation and direction.

In consequence of this mode of increase, and of the extreme rapidity with which the zoospores run through their course from germination to the production of perfect spores, the quantity of bodies capable of propagating the disease which may arise in the course of one season from a single diseased plant is almost incredible. Passing over the stem, from which the perfect parasite more seldom makes its appearance, it is calculated that one square line of the under surface of the leaves is capable of producing 3270 spores, and as each of these yields at least six zoospores (the number being sometimes as high as 16), we have 19,620 reproductive bodies from that small space. The quantity therefore yielded by a single plant is enormous, and as the mycelium from the zoospores is capable of penetrating the cellular tissue in 12 hours, and when once it is established there and bursts through the breathing orifices or stomates of the leaves, it perfects its fruit in from 15 to 18 hours, and since the zoospores are perfected and ready to germinate in 24 hours from their being placed in water, it is scarcely possible to calculate the myriads of plants that may spread from a single centre. As continued moisture is absolutely necessary for the germination of the spores and the production of the zoospores, it will at once be understood how rapidly the disease is propagated in wet weather, especially if it be warm, and what a check to the disease a season like the present autumn must be. It will also be apparent under what circumstance the zoospores will have readiest access to the tubers, and that those which are nearest the surface have a less chance of escaping than those which penetrate deeper into the soil.

That the brown spots so characteristic of the disease are a consequence of the action of the spores or zoospores has been proved by direct experiment by Dr. de Bary. By placing a quantity of spores in a drop of water on the leaves, stems, and tubers under a bell glass so air-tight below that evaporation cannot very readily take place, he has produced the brown spots, and has traced their progress from the first penetration of the spawn of the fungus from without, when the discoloured specks are quite microscopic.

He has, moreover, shown that neither the spores nor sporangia can resist many weeks of continued drought; and inasmuch as the spores so rapidly produce zoospores when exposed to sufficient moisture, it is clear that the disease cannot be propagated from year to year by means of either. As regards another form of fruit which has been observed, though very rarely, amongst the creeping threads of the spawn, too little is known to speak with any probability, much less with certainty, of its powers of endurance.

As, however, it is a well-known fact that fungi may appear under very different forms, and that there are two fungi, especially *Fusiporium Solani*, which form the

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* "That is by reproductive cells, which move about freely by means of two or more long lash-like threads, or a multitude of short processes, like many of the more minute animals."

white nodules on the decaying tubers, which are almost as constant attendants on the potato murrain as the well-known parasite of the leaves, it became necessary to follow out their growth, to see whether in any case the fungus of the leaves or the brown spots could be produced from the white moulds of the tubers. Every experiment, however, under whatever form it was made and however varied, produced only like from like, and De Bary was obliged to give up the notion as visionary. It appeared clear, therefore, that the disease was transferred from year to year by means of the tubers, which when impregnated with the mycelium, and not in too advanced a state of decomposition, always yield on experiment the true fungus of the potato murrain. The conclusion from the whole matter is clearly this, that it is quite useless to attempt to destroy by any external remedies, a parasite which so completely undermines the tissue of the plant, as in the case of the vine mildew, where the threads of the parasite creep over the surface. Early planting, removal of the haulm when diseased, drying of the tubers, and other remedies which have been recommended, must be considered rather as palliatives than preventives. De Bary, however, suggests one mode which may in all probability prove useful in careful intelligent hands. A plot of ground of sufficient size only for the production of the seed tubers which may be requisite, and as distant as may be in the farm from the general potato crop, is to be selected, and that perfectly well drained and as much adapted as possible for the growth of healthy tubers. This is to be planted with tubers which show no outward trace of disease. The crop is then to be watched carefully, and the moment a diseased leaf appears, it is to be removed and destroyed, the cultivator himself undertaking the task, and going carefully over the plot, which must of course be of manageable dimensions, two or three times a day. The stems are also to be watched, and, if necessary, they, as well as the leaves, must be removed. The zoospores under such circumstances, unless brought from a distance, cannot be washed down to the tubers, and a very few only will be diseased. A repetition of the process would, in all probability, banish the malady in great measure from the farm. It is obvious, however, that the cultivator must have a distinct knowledge of his enemy before he sets to work, and not mistake merely withered or curled leaves for the ravages of the mould.

We may speak highly from our own experience of the benefit of deep digging before the potatoes are planted, though they themselves should not be sunk too far in the soil, and of a second hilling up to cover effectually the more superficial tubers. Those which are deep seated are seldom diseased except in very unpropitious years.

We may add a peculiar circumstance which has occurred to De Bary in the course of his experiments. On dividing sound potatoes, for the sake of observing the difference which takes place in those parts which have been left in their original condition, and those to which he applied the zoospores, he found that after a time a new cuticle, consisting of several layers of table-shaped cells, was produced on the cut surface. This is precisely what takes place in the disease called scab, as will be found in a memoir on the subject in the third volume of the *Journal of the Horticultural Society of London.—Gardeners' Chronicle.*

ON THE DELETERIOUS EFFECT OF LIGHT ON POTATOES.

The influence of light on vegetation is now regarded as a matter of the utmost importance, and although the precise mode of action may not be always understood, yet powerful effects of it are everywhere perceptible. In its absence leaves become blanched that would otherwise be green. Roots that are white underground become green when exposed. Turnips, white beneath, are green or perhaps red above, and many kinds of fruit, naturally pale, colour under bright sunlight. By the action of light on leaves, the different secretions peculiar to plants are formed, such as gum, sugar, starch, oils, and even in certain kinds of plants deadly poisons. In some plants, too, the secretions due to the action of light are in certain portions harmless and nutritious, whilst in other parts of the same plant, through the same agency, highly deleterious principles are formed. The potato offers an example. Everybody knows that its tubers contain wholesome food, and it is also generally known that the stems, and especially the apples or seed vessels, are deleterious. But the treatment to which the potato is sometimes subjected is calculated to develop the

poisonous quality in the tubers themselves, a change which can only take place during exposure to light. The poison found in the green parts of potatoes is called Solanine. This exists in several species of Solanum, "and is found in considerable quantity in the shoots of potatoes. To obtain it the shoots are bruised and acted on by water acidulated with sulphuric acid. It is very poisonous." (Turner's *Elements of Chemistry.*) Liebig says it is a powerful poison.

Although the stems of potatoes, according to the authorities just quoted, contain in notable quantity the noxious and easily extracted principle, so dangerous in its concentrated form, yet the tubers grown underground and kept in the dark are floury and white when cooked, if the variety of potato is good, and quite free from acrid taste, which is one of the characteristics of Solanine, and a sure indication of its presence. But the potato tuber is in reality a sort of stem, for it is furnished with buds, which, under favourable circumstances, push into shoots, as buds do on stems above ground. It is therefore highly susceptible of the influence of light, for although both its skin and flesh are white, they soon become green by exposure; and the continued presence of light renders them as green as stems above ground. It is said that pigs have been killed by giving them potatoes greened to this extent. Such of course could not be sold for human food. For this purpose potatoes exposed to light must be housed or otherwise shaded before the green tinge is apparent, at least to the naked eye. But under the impression that the tubers keep better after having well basked in the sun, many cultivators are in the habit of turning them up, and spreading them out on the surface of the ground in bright sunny weather. This has the effect of greatly deteriorating their quality. Notwithstanding disease, really good potatoes can be found; but even slightly diseased ones, with the infected portions cut away, are infinitely better than quantities of others which, though they have a goodly appearance, have been greened. Instead of being white and floury when cooked they are yellow and have a disagreeable acrid taste, which can scarcely be disguised, or if it should, there is no proof that the deleterious effects of the acrid principle are counteracted. At all events, it would certainly be very desirable that such means should be adopted as would prevent that principle being generated, or in other words the tubers should be kept as much as possible in the dark instead of exposing them to light. The advantage of exposure as regards better keeping is doubtful, whereas the deterioration it occasions in the quality of the tubers as an article of food is certain. I have thus endeavoured to draw attention to the subject, and it is the duty of every one who is aware of the deleterious effects of light on the potato to explain it to those who are not; for a knowledge of, it if acted upon, would prove beneficial to both rich and poor.—*The Gardeners' Chronicle and Agricultural Gazette.*

ON THE TREATMENT OF GOUT BY GUACO.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—The great success I have met with in the treatment of Gout by the administration of *Mikania Guaco* induces me to draw your attention, and that of your readers, to its valuable effects. Some seven years ago I directed the notice of the profession to the subject in an article in the *Medical Times and Gazette.* Since then, my experience of this useful drug has been so convincing of its efficacy, that I should fail in my duty to science and my brethren of the faculty were I to conceal its virtues. The form I have exhibited it in is that of the tincture, made from the ordinary stem, sliced, &c. Dr. Adrian Stokes, of Stroud, mentions that the properties of "Guaco" have been highly extolled by a Spanish gentleman of Cuba, Señor Don Andreas Dias. The immediate action seems to be powerfully tonic—"a stimulating tonic."

Dr. Duvon, of Guayaquil, found it exceedingly successful in the removal of chronic rheumatism and sciatica.

Dr. John Lewis Donnet, of the Royal Naval Hospital at Lisbon, placed much confidence in the remedy, as a tonic in recovery from bilious remittent fever of the tropics.

I am not aware if either of these gentlemen tried it in gout, but, on looking over my notes, it is almost incredible the uniform relief (in every instance of well-

diagnosed, indisputable podagra) that has followed its exhibition. The Guaco of Oronoko is said to be specific against the bite of serpents and snakes. Dr. Hobson, of Leeds, whom I presented with a preparation of the Guaco, experimented on rabbits bitten by the Cobra da Capella, but without any success which is imputed to its application, and undoubtedly his careful method of using the antidote should have succeeded, yet I am disposed to believe in this instance it is the fresh, succulent, Aristolochiaceous plant, newly plucked, that may possess principles lost by keeping and storing the specimen. Certain am I that in seeing the natives rush to the plant in cases of being bitten by venomous reptiles, all their fear disappeared on getting a handful, and, chewing it, apply it to the wound as quickly as possible—some even carrying it about them in readiness for such an accident.

The usual dose I have been in the habit of giving in attacks of gout is from ʒss. to ʒj. of the tincture every four hours, largely diluted with distilled water—a tumbler each time; and applied externally by sponge or saturated flannel over the part affected.

The following is the formula for the tincture of Guaco:—

Guaco, sliced, 5 ounces.
Proof Spirit, 2 pints.
Macerate for fourteen days, and strain.

I remain, faithfully yours,

EDWARD WM. PRITCHARD,
M.D., M.R.C.S.E., & L.S.A.

11, *Berkeley Terrace, Glasgow, N.B.*

MORE POISONINGS BY FUNGI IN FRANCE.

IN the October number of the *Journal de Chimie Médicale* particulars are given of some recent cases of fatal poisoning by eating deleterious fungi in France. The first case narrated is that of a gentleman, M. de Saint Laurent, seventy years of age, who took a fancy to gather in the brushwood near his dwelling a great quantity of a very dangerous species of fungus, and which, by a fatal mistake, quite inexplicable in so well informed and intelligent an old man, he regarded as edible. Notwithstanding the objections raised by his cook to these mushrooms on account of their appearance, he had them prepared for his own table, and for that of his servants; he ate freely of them at breakfast, and not experiencing any ill effects from their use, he partook of them again at dinner. Four also of his servants followed the example of their master, and ate sparingly of the same mushrooms. The dangerous, although tardy, effects of the poisonous mushrooms they had partaken of, began to show themselves in the early part of the same night, and M. de Saint Laurent expired the following morning, after having presented the most intense symptoms of acute inflammation extending throughout the whole length of the intestinal tube; and without his two physicians being able to afford him the least relief.

The four servants, all of a robust and vigorous constitution, were also attacked with the same symptoms, and only escaped death through the small quantity of mushrooms they had eaten, their hardy frames, and the energetic means adopted for their recovery. With all these sick persons, the symptoms of poisoning first exhibited themselves from the tenth to the twentieth hour after the mushrooms had been swallowed.

The second case was that of three Zouaves of the Imperial Guard in the military hospital of Versailles. It appears that they had all eaten some fungi of a poisonous nature, a species of *Amanita*, and in eighteen hours afterwards were attacked by serious symptoms, and after suffering excruciating agonies during a period of twenty-four hours, they all died.

SUICIDE BY LAUDANUM.

ON Thursday, Oct. 10th, an inquest was held at Gloucester, on the body of the late Viscount Forth. The evidence adduced was to the effect that the late Viscount, who was the only son of the Earl of Perth, took up his abode at the Spa Hotel, Gloucester, in July last. He was accompanied by a lady about his own age, who

passed as Mrs. Drummond. On the 19th ult. the lady gave birth to a female child, but afterwards became very ill, and was attended by Drs. Evans and Greaves. Their skill, however, proved of no avail, for she expired at five o'clock on the morning of the 8th of October. The deceased nobleman, who was with her at the time of her death, was very much grieved, and wept bitterly. Soon afterwards he commenced drinking brandy, and appeared like a madman. In this distracted state he continued for several hours, after which he commenced packing his own and the deceased lady's clothes, and in doing so he took a small roll of paper up, saying, "This belongs to me." He then left that room (in which were the nurse and landlady) and proceeded to another opposite, followed by the nurse, whose suspicions were excited by his conduct. He asked what was the matter, at the same time putting a bottle to his mouth. The nurse exclaimed "Good God, he's got hold of the laudanum bottle!" The landlady seized the bottle and succeeded in wresting it from him, but not until he had drunk nearly half. He said, "It's only a little port wine," and descended to the sitting-room. The bottle, with the remainder of the laudanum in it, was produced. It bore a label, "Laudanum, Poison." Mr. Greaves, one of the medical attendants, stated that on Tuesday morning, Oct. 9th, he was requested to attend the deceased lady, and on his way to the hotel he met the deceased in a most excited state. He said, "Greaves, my dear fellow, I believe she is dead;" and he cried most bitterly on the way. On arriving at the hotel witness found she had just died. The deceased threw himself upon her and sobbed bitterly, and after kneeling at her bedside and crying for some time, he rushed to a table on which was a bottle of brandy, and drank nearly half a pint, witness taking it from him. Witness accompanied him down stairs, he being still exceedingly excited from grief and excess of stimulant; he was perfectly insane for a time. On entering the drawing-room he seized a knife on the chimney-piece, and attempted to make a gash across his throat; witness seized his hand and took the knife from him, and on leaving gave directions for him not to be left alone. Witness was called to attend him after he had taken the laudanum. He found him apparently asleep. He aroused him, when he said, "I have not taken so much as they say." He then became drowsy, and did not speak again. Witness sent for another surgeon, and they applied the stomach-pump. They also applied an electro-magnetic battery to the nerves, spine, &c., but the deceased never recovered consciousness, and died in the evening. The laudanum he had taken witness had ordered for the lady as a fomentation. The deceased was very intemperate in his habits. This doubtless had a great effect upon his mind, particularly as he did not take his usual exercise. During the lady's illness he confined himself almost wholly to her room, and waited upon her night and day. His brain suffered from his excesses and confinement. The *post-mortem* examination showed that the cerebellum was much softened, and thereby self-control was lost. The jury returned a verdict that Lord Forth died from poison, taken while labouring under temporary insanity.

MISCELLANEA.

The Local Application of Chloroform.—M. Martenot, a French military surgeon, relates two cases of operation for ingrowing nail, in order to demonstrate his mode of obtaining anæsthesia from the local employment of chloroform. First, pretty firm compression is made at the base of the toe by means of a ligature, and then a thick piece of charpie, soaked in a mixture of chloroform and camphor (20 parts of camphor to 30 of chloroform), is applied for fifteen or twenty minutes, or more, and covered over with a thick piece of linen and some oiled silk, so as to prevent too rapid evaporation. The surgeon assures himself of the production of the anæsthesia by pricking the toe, and at once proceeds to the operation, which, painful as it usually is, may, by the above procedure, be performed without any suffering.—*Gazette des Hôp.*, No. 92.—*Medical Times and Gazette.*

Ferri Carbonas Effervescens.—Dr. Skinner, in a letter to the *British Medical Journal*, of August 24th, states that he has seen several failures in the making of this preparation. He regards uniformity of whiteness, briskness of effervescence, and absence of nausea or catharsis, when ingested, as the best criterion of the purity and excellence of the preparation. One cause of failure, Dr. Skinner thinks, may be

the moist and oxidized condition of the sulphate of iron used in the process. The salt should be taken only from the best unoxidized crystals, and ought to be rendered perfectly dry, as much as possible out of the contact of oxygen.

Dalleochine or Quinine Green.—10 grm. sulphate of quinia, 1000 grm. water, .128 litre solution of chlorinated lime, .032 lit. muriatic acid, and .192 lit. liquor ammoniæ are heated to 20° R. (77° F.), and after cooling, filtered. The dalleochine has the appearance of a green resin, is fusible, insoluble in water, benzine, oil of turpentine, bisulphide of carbon and ether, but soluble in alcohol, wood spirit and glycerin. Acetic acid imparts to it a blue colour, nitric, muriatic, and sulphuric acids dissolve it with a brown colour, the green being restored on neutralization. Its solutions are precipitated by caustic alkalies, by corrosive sublimate, pale green; decolourized by protochloride of tin; nitrate of silver and alum have no reaction. The alcoholic solution, diluted with water, dyes silk, woollen and cotton, the latter with a mordant of albumen.—*Dingl. Polyt. Journ.*, clix., 66, 67. *Ch. Centralbl.*, vi., 224.—*American Journal of Pharmacy.*

The Poison of the Toad.—The most deadly poison known to be used by the slaves in Brazil is that of the toad. The skin of this reptile contains glands which secrete in abundance a milky, glutinous fluid when the toad is put to pain or irritated. This is scraped off and dried. It produces incurable obstruction and enlargement of the liver, and a speedy death. Some beat the toad with rods to make it secrete the venom; others place the animal in an earthen vessel over a slow fire.—*Dr. R. de Gumbleton Daunt*, in *Dublin Medical Press*, September 25th.

Poisoning Noxious Animals.—On account of the numerous accidents which have occurred from using arsenic and phosphorus for this purpose, M. Sevérin Caussé, at the request of the French Government, has been pursuing a series of investigations with the object of devising some means of poisoning which should be as efficacious and more safe than those in use. As general principles he lays down these rules:—1. That we must not risk mistakes by employing the poison in the form of biscuits, pills, or powder; 2. An excipient must be used which is repugnant in taste to man but not to animals; 3. Emetic substances should be added, so as, in case of the poison being swallowed accidentally, vomiting may be produced, which is not with gnawing animals like rats and mice; 4. The substance should be easily detectable by chemical analysis; 5. The composition he finally recommended as the best suited as a destructive agent, consists of tallow 786 grammes, tartar emetic 153 grammes, and euphorbium 51 grammes. These, mixed with a pinch of aventurine (added for facility of detection in case of human poisoning), by the aid of 10 grammes of cotton, are made into thirty-two candles, each of which would suffice to poison several rats or mice.—*Annales d'Hygiène*, vol. xv., p. 425.—*Medical Times and Gazette.*

Death from Burning by Sulphuric Acid.—Mr. Payne has held an inquest at St. Thomas's Hospital on George William Cooper, in the employ of Mr. Savage, Bermondsey, oil merchant. While standing on a small cask, it tilted over with him, and to save himself from falling he caught hold of a large carboy of oil of vitriol, which was standing near on a shelf, and uncorked. The result was, that the carboy was upset, and the contents passed over his head, neck, and lower part of his body. He was conveyed to the hospital, where death put an end to his sufferings.—The jury returned a verdict of "Accidental death."

Death from Swallowing Mazagan Beans.—Susannah Richardson, aged four years, died a few days since at Rayne, from the rupture of an intestine, caused by her having swallowed the extraordinary number of 180 Mazagan beans. A *post-mortem* examination revealed the fact, and many of the beans were found to be so large that it was difficult to conceive how the child could have swallowed them whole.

Death from Sulphurous Acid Fumes.—An accident has occurred at Dovercourt, resulting in the suffocation of four persons (two women, one man, and a child), and the narrow escape of a fifth person. Within a short distance of the village of Dovercourt are extensive cement works carried on by Mr. J. Pattrick, a cement manufacturer of Harwich, and immediately contiguous to the works are some cottages, occupied by the families of men in Mr. Pattrick's employ. These buildings are so situated that they become completely impregnated with the fumes of sulphur

from the works, and it is stated that persons had previously been compelled to leave them in consequence of their habitations being dangerous to human life. It appears that the five inmates of one of the dwellings in question retired into their house after the ordinary hours of labour had expired on Wednesday evening, Oct. 2nd, but one of the men shortly afterwards left home and proceeded to Harwich. On his return, about 11 o'clock, he entered the house, and was startled to find his comrades and their families insensible in various parts of the dwelling, which was so filled with fumes of sulphur from the kiln in the rear that he was almost suffocated. He vainly endeavoured to arouse them, and was proceeding to obtain the assistance of a neighbour, when he fell near the door, where he was subsequently found more dead than alive. When the place was entered, the wife and child of this unfortunate man were found quite dead, and another man and his wife were discovered lifeless on the floor. The bodies presented a shocking spectacle, the features being much distorted. An inquest was held on Thursday, Oct. 3rd, before Mr. W. Codd, one of the coroners for Essex, when a verdict of "Accidental death" was returned, accompanied by a request to Mr. Pattrick that three of the dwellings should immediately be pulled down.

Poisoning by Opium.—At an inquest at Sydney Hotel, Goole, on the body of a child, who died from the effects of opium given by its mother, a woman named Torkington, the wife of a police-officer residing at Stockport, who was on a visit to her mother, Mrs. Scholes, Lower Bridge Street, Goole, the following particulars were elicited:—Mr. R. P. Bell said: I am a surgeon in Goole. About two o'clock on Wednesday morning Mrs. Scholes called me up to attend her daughter. I went at once, and found a young child apparently in a profound sleep. The mother was sitting in a chair in the same room, talking in a wild and wandering way, and was making efforts to vomit. I asked the grandmother what they had been giving to the child, and she replied, "My daughter says she has given them a pennyworth of opium." I at once gave an emetic, but this had no effect. I gave a second, with the like result. I then used the stomach pump, but was still unable to give relief. In passing the tube the child vomited a small quantity of mucus. The child died about 7 A.M. There was no possible chance of saving its life. I produce the contents of the stomach, and on examining it I found a strong smell of opium. I found a brown powder secreted among the mucus taken from the stomach. I am sure that powder was poison, and that the child came to its death from an overdose of opium, or some other narcotic poison such as opium or laudanum. I have tested the contents of the stomach by test paper, and find an acid reaction. I heard that the prisoner had another child, and when it was brought down I saw that it was suffering from the effects of opium. It was then staggering, and in a very nervous state. I gave him an emetic, and one to his mother, and afterwards repeated them, which caused free vomiting. I ordered them some strong coffee, and had them walking about for some time. The boy is now better, and the mother has also recovered from the effects of the opium, but she is in a very unsettled state of mind. The prisoner told me that she had bought a drachm of opium, which cost her 3½*d*., and that they had all taken it. It was proved that the prisoner said to her mother "We have all had opium, and shall be dead directly." It was also stated that she had been an inmate of the Stockport Infirmary, and had attempted to hang herself. Mr. William Steele, assistant to Mr. Leggitt, druggist, proved that the prisoner applied to him for ¼ oz. of opium, and that he cautioned her several times, and asked if she knew that it was a deadly poison. She said she did, and from her appearance he thought she was in the habit of taking it.—The jury returned a verdict of "Wilful murder" against the prisoner.

Poisoning by Phosphorus Paste.—An inquest has been held at the village of Cardewlees, near Carlisle, on Sarah Carrick, who had poisoned herself with phosphorus paste, or rat poison. Deceased, who lived with a farmer near Hornsby, at Dockray Hall, near Wigton, went into the garden to a fellow-servant, named Isabella Irving, and said she was going to take some rat poison. Irving said it would be a sin if she did. Nothing more was said on the subject till after dinner, when deceased again told Irving she was going to take the poison, and proposed that Irving should also take some. She then produced a small pot of phosphorus paste, and gave Irving one half and kept the other. Irving merely tasted hers, and put the rest in her

pocket, but deceased swallowed hers. In the afternoon she asked Irving if she was any worse, and Irving said no. Deceased said she felt sick. She continued ill all night, and on the Thursday following she was removed to her mother's, and on Saturday she died. She had told her mother that it was in consequence of having been badly used by her master that she had taken the poison; but evidence was given to show that she had been well treated.—The jury returned a verdict that death had been caused by the phosphorus, but that there was not sufficient evidence to show in what state of mind she was in at the time.

Alleged Poisoning by Phosphorus.—The Court of Assizes at Bruchsal, in the Grand-Duchy of Baden, has tried the Baroness de Baurnbach on a charge of attempting to poison her husband, Baron de Baurnbach, Marshal of the Court of Carlsruhe, by mixing phosphorus with his food and drink. The baroness, who had been liberated on bail, was present in court, and replied with great composure to all the questions addressed to her by the President. It appeared from the indictment that on the 20th of May last John Fritsch and Amelia Leist, both servants in the baron's family, went to a chemist, named Rœderer, at Carlsruhe, and showed him a piece of phosphorus, which they said they had found in the baron's beer just after the baroness had sweetened it with sugar. As the servants hesitated to speak to their master on the subject, the chemist advised them to communicate with the family physician or their pastor. On the following day Fritsch accordingly went to Dr. Benchegger, and stated that the baroness had attempted to poison her husband; that the cook-maid has seen her mistress put something into the beer while warming it in a saucepan, which they had afterwards ascertained to be phosphorus; and Fritsch showed the piece of phosphorus to the doctor, who made the fact known to the police after speaking on the subject to the baroness, who declared that she could not account for the fact, but would speak to her husband on the subject, which she did at once. The same evening several slices of toasted bread smeared with phosphorus were found on the floor of the dining-room, having been laid there to kill rats and mice. This poison had been bought a month before by Fritsch, in obedience to his master's orders. The servant who had poisoned this bread declared that he had put the remaining phosphorus in a glass, and thrown it over the garden wall. The maid-servant, Amelia Leist, stated that she had pounded the sugar-candy, and put it into the beer while on the fire. Just as the beer was about to boil over the baroness, by whose orders she had prepared it, entered the room and took it off the fire; but neither herself nor the cook saw her put anything into it, though when the baroness had left the room they thought the beer had a strange smell, and at the bottom of the saucepan they found two small lumps of a bluish-yellow colour, which they found to be phosphorus. The baroness drank some of the beer herself, but neither she nor the baron felt any inconvenience from it. Phosphorus was afterwards found in so many places about the house that the charge of poisoning seemed a conspiracy on the part of the servants, some of whom had received notice to leave. Fritsch, Amelia Leist, and Heiss, the cook, were arrested in consequence, but after examination were released and admitted as witnesses. Various reasons, one of which was jealousy, were assigned as the baroness's motives for poisoning her husband, but they proved to be idle and malicious inventions. The baroness defended herself with dignified composure, and was well supported by her husband and her daughter, according to whose evidence their family had always been a very happy one. The jury declared the accused not guilty. The announcement of the verdict was received with irrepressible applause.

Poisoning by Strychnine.—An inquest was held on Tuesday, Oct. 1, at Witheral, near Carlisle, on the body of William Hoodless, four years of age. The child had been ailing for some time, when Dr. Hendrie, of Carlisle, was consulted. He attributed its illness to worms, and prescribed a medicine. It was given to the deceased in the form of a powder mixed up in some preserves. Half an hour after it was taken the child fell on the floor, and died in violent convulsions. A *post-mortem* examination of the body was made by two medical men, who reported that death had resulted from a dose of strychnine. At the inquest, Dr. Hendrie stated that he meant to administer powders composed of santonine. In his surgery, however, the santonine bottle and the strychnine bottle stood together. Both were

covered with blue paper, and both were labelled, but the rain had got in and destroyed the writing. He had in consequence taken up and used the wrong bottle. The jury found that the child had died from strychnine inadvertently administered by Dr. Hendrie. They recommended that "he and all other doctors should have their bottles properly labelled."

Accidental Poisoning by Cyanide of Potassium.—On Tuesday, October 15th, an inquest was held by the coroner for Westminster on the body of Mr. John Baker, aged 39, overseer to Mr. Reilly, gunmaker, Oxford Street. Captain John Burnaby, on the night before the death of the deceased, had been in company with him. He then complained of flatulence, and said he should take a black draught as a remedy. Mrs. Baker, the wife of the deceased, said that after going to bed her husband asked her to go to the safe and fetch him a bottle containing medicine. As soon as he had drunk some of it he said, "My dear, I have taken aquafortis." He called for mustard and water, which he drank, and in the act of going up-stairs he fell. Dr. Black and Dr. Grey arrived shortly afterwards, but they had not been long in the house when the unfortunate man died. The *post-mortem* examination of the body showed that the deceased had suffered from a serious internal complaint. The remainder of the contents of the bottle (from which the draught had been taken) proved on analysis to be a weak solution of cyanide of potassium used to stain gun-barrels. The jury returned a verdict of "Death from taking poison by mistake."

Poisoning by Mistake.—Mr. Hanbury Leigh, of Pontypool Park, the Lord Lieutenant of Monmouthshire, died from the effects of poison given him at his residence, Plymouth House, Penarth, near Cardiff. Mr. Leigh, who had reached his 81st year, met with a slight accident by falling down part of the staircase. A bottle of medicine was ordered to be given the aged patient, and some embrocation to be applied to his back. On Friday night, Sept. 27th, the butler was requested to give his master a portion of the medicine. The two bottles, one containing the medicine and the other the embrocation, were upon the mantelpiece. The butler gave the deceased the embrocation instead of the medicine. The fatal mistake was instantly discovered; medical men were called in, and the usual remedies were applied. The sufferer called his household around him, shook hands with them, and more than once begged they would not hurt his butler, who had given him the poisonous liquid in mistake. He died the following evening.

Mistake in Labelling Medicine.—Philadelphia Osborne, a child 18 months old daughter of a miner of Canon's Town, Ludgvan, was suffering from scarlatina, and her father went to Mr. Jas. Mudge, of Hayle, for medical advice. In Mr. Mudge's absence, Mr. Wolf, his assistant, went to see the child, and on his return made up a bottle of mixture for the child; at the same time he made up a liniment for another patient living at Canon's Town, intending to send it by Osborne. Mr. Wolf wrote two labels: one was "two teaspoonfuls to be taken four times a day, Richard Osborne's child;" the other was "Liniment to be rubbed on the shoulder, Miss Thomas." The label for the mixture was placed on the bottle of liniment, and that for the liniment was placed on the bottle of mixture. The mother gave the child a dose according to the directions on the bottle, and two or three hours afterwards observed a great change in the child, which led to an examination of the medicine and to the discovery of the mistake. The child died during the night. An inquest was held before Mr. Hichens; a *post-mortem* examination having been made by Mr. Hosking, and an analysis by Dr. J. B. Montgomery, of Penzance. The medical evidence was to the effect that malignant scarlatina was the cause of death. The jury returned a verdict of "Died from natural causes."

[A report of the above case has been given by the *Lancet*, with its usual candour, as a specimen of the "Carelessness of Druggists." Perhaps it would have been better to have first ascertained that the mistake was due to the "carelessness of a Druggist," as we find by the Medical Directory that Mr. James Mudge is a Member of the Royal College of Surgeons, and the *Cornish Telegraph*, in which the case was reported, states that Mr. Wolf, the assistant, is duly qualified.—Ed. Ph. J.]

REVIEW.

THE FORESTS AND GARDENS OF SOUTH INDIA. By HUGH CLEGHORN, M.D., F.L.S., Conservator of Forests, Madras Presidency. London: W. H. Allen & Co. 1861. 8vo, pp. 412.

This neat and unpretending volume, emanating as it does from one who has specially devoted himself to the task of organizing a system of conservancy for our Indian tropical forests, as well as for carrying out the scheme of plantations to replace them when exhausted, will, no doubt, attract merited attention from those who have given the subject that consideration which it deserves. The subject of preventing the destruction of the forests of India appears to have first attracted the attention of Dr. Wallich in 1827, although, from the importance of the subject in a country where there is no other fuel than wood, it certainly ought never to have been neglected. In 1850 it appears to have come under the notice of the British Association for the Advancement of Science, who appointed a committee to consider the subject, and the result of their deliberations appears to have been the institution of the present system of conservancy, as detailed in the four annual reports of Dr. Cleghorn to the Government, and published by him in the work under notice. Of late years it was found, as Dr. Cleghorn remarks, that the unrestrained liberty of appropriation of unoccupied forests accorded to any individual, led to the almost entire extermination of the teak, which, as a material for shipbuilding, it is of the utmost consequence to preserve. The careless rapacity of the native population, and the unscrupulous dishonesty of contractors and traders, who cut large tracts of forest and cleared away all the trees, whether young or old, without any control of the authorities, and without reference to ultimate results, had almost led to the destruction of those extensive forests which flourished in full vigour at the commencement of this century, and threatened to deprive the state of those supplies which were indispensable to the public service. All this appears to have been put a stop to by a judicious system of conservancy, and Dr. Cleghorn's account of the working of this new system is very well worth perusal.

The drawings of Indian scenery and map of South India which the volume contains, are well executed, and deserve especial notice. Dr. Cleghorn does not treat so much as we had hoped on Indian medicinal plants and their various products, and we have looked in vain, and with some disappointment, for at least stray notices of Cassia Bark, Cardamoms, Chiretta, the fragrant Andropogons, and such-like forest productions of the country. In this matter, the work seems deficient, which must be ascribed to the author's unbroken attention to the more important objects of the forest department. Of the different trees introduced into India and flourishing well there, we find named the African Baobab tree, now common throughout the Madras Presidency, Lignum Vitæ (*Guaiacum officinale*), Logwood (*Hæmatoxylon campechianum*), and Pimento (*Myrtus Pimenta*). The indigenous medicinal plants mentioned are the Orange (*Citrus Aurantium*), Bael (*Ægle Marmelos*), *Pterocarpus indicus* and *Pt. Marsupium*, both yielding Gum Kino, Red Sandal Wood (*Pterocarpus santalinus*), *Rottlera tinctoria*, *Strychnos Nux-vomica*, the poisonous fruits of which, according to our author, are the favourite food of the hornbill, *Tamarindus indica*, *Cathartocarpus Fistula*, *Wrightia antidysenterica*, &c., &c. We also learn that the Jalap (*Exogonium purga*) thrives well in the Botanical Garden of Bangalore, and that preparations are being made for cultivating the drug on a more extensive scale. *Atropa Belladonna*, *Hyoscyamus niger*, *Leontodon Taraxacum*, *Mentha piperita*, and *Digitalis purpurea*, are grown for use as in England. Of *Cephaëlis Ipecacuanha* there is a small specimen in the Utakamand Garden, but the climate does not appear favourable to its development, which is the more to be regretted as, after quinine, the root of this plant is the most important of drugs to the Indian medical practitioner.

The classified list of the woods, 155 in number, grown in the Madras Presidency, either native or introduced, is a very valuable digest of all known on the subject at present, and will doubtless be deservedly esteemed. The catalogue of plants in the Bangalore Public Garden should likewise claim attention. Altogether, Dr. Cleghorn's work is one which contains no small amount of valuable information, which, although in a somewhat disconnected form, is likely to be of much service, especially in India.

BOOKS RECEIVED.

An Introduction to Practical Chemistry, including Analysis. By John E. Bowman, F.C.S., &c. Edited by Charles L. Bloxam, Professor of Practical Chemistry in King's College, London. Fourth Edition. London: John Churchill, New Burlington Street. 8vo, pp. 311. 1861. (From the Publisher.)

A Manual of Chemistry, Descriptive and Theoretical. By William Odling, M.B., F.R.S., &c. Part I. London: Longman, Green, Longman, and Roberts. 1861. Pp. 380.

TO CORRESPONDENTS.

W. Bermington (Bath House, Sidmouth).—The subject alluded to in your letter has been fully considered by the Board of Examiners, and is about to be brought under the notice of the Council. As soon as a decision has been arrived at, it will be published in the Journal.

X. Y. Z.—"Galliac" (*the specificum antipodagricum Emerigonis of the Germans*) consists of two ounces of guaiacum digested for eight days in three pints avoirdupois of rum or brandy. Pereira, *Mat. Med.*, page 1923. The dose is one or two tablespoonfuls in the morning, fasting.

X. O. X. (Loudon).—*Manganese Ointment* is made in the proportion of ℥ij. of oxide of manganese to ℥i. of lard. Ointment of sulphate of manganese is made in the proportion of ℥i. of the sulphate to ℥i. of lard.

J. S. (Dalkeith).—A solution of two ounces of sal ammoniac in a quart of vinegar would probably answer the purpose; for further information on the subject consult Ure's *Dictionary of Arts and Manufactures*, or Cooley's *Practical Receipts*.

G. A. G. (Callington)—States that in preparing the compound iodine ointment of the Pharmacopœia, it is difficult to dissolve the iodine in the quantity of spirit ordered. He suggests the addition of a portion of the iodide of potassium to the iodine and spirit, as greatly facilitating the process.

W. W. (Camden Town).—*Syrups of the Superphosphates.* See vol. i. (Second Series), page 497.

J. F. (Cheltenham).—The labels referred to are not liable to Medicine Stamp Duty.

M. E. M. (Chelmsford).—About £40 per annum.

Sigma (London).—Mr. Orridge, 30, Bucklersbury.

Delta (Coventry).—The term "Poison" has a very wide application, but the substance in question would scarcely come under the popular definition of the term.

An Old Member (Jersey).—The formulæ required will be found in this Journal, vol. i. (Second Series), page 497.

A. Z. (Liverpool).—*Liquor Sarsæ Compositus* made of the same strength as the *Extractum Sarsæ Liquidum* of the London Pharmacopœia.

Excelsior (Guildford).—The powder, when prepared according to the Pharmacopœia, is of a pale yellow colour; the addition of colouring matter to produce the "bright yellow" alluded to would not be justifiable.

E. W. (Middleton).—Möhr and Redwood's *Practical Pharmacy* (Walton and Maberly), 6*s.* 6*d.*; Pereira's *Materia Medica* (Longmans), £3 15*s.*; Bentley's *Manual of Botany* (Churchill), 12*s.* 6*d.*; Fownes's *Manual of Chemistry* (Churchill), 12*s.* 6*d.*; Wilson's *Anatomists' Vade Mecum* (Churchill), 12*s.* 6*d.*

A Young Country Chemist.—Chemists are not authorized to retail spirits of wine without a spirit license.

J. W. L. (Stratford-on-Avon).—The subject is considered to have been discussed to a sufficient extent.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. III.—No. VI.—DECEMBER 2nd, 1861.

THE RIGHT OF CHEMISTS AND DRUGGISTS TO PRESCRIBE.

We are often applied to by correspondents for information as to the liability incurred by Chemists and Druggists who undertake to prescribe medicines to those of their customers who consult them with reference to their ailments. The subject has been repeatedly referred to in this Journal, and we have nothing now to offer with reference to it that differs in any essential point from what has been stated before. We have always maintained the right of the Pharmaceutist, in supplying the public with medicines which they use as remedies for disease, to advise with their customers as to the best selection and mode of application of such domestic remedies. The qualified Pharmaceutist is capable of affording important assistance to his customers in this respect, and unless the public are to be restricted from prescribing for themselves, they cannot surely be prevented from seeking information with reference to the action of the remedies they employ from those who are able and willing to give it them. That the advice thus given sometimes assumes a more questionable character there can be no doubt, involving, as it does, the diagnosis of disease, and the recommendation of remedies, in cases where the prescriber has no adequate medical qualification. We have always contended that as Pharmaceutists become better qualified for the exercise of the legitimate duties of their profession they will be less disposed to undertake duties for which they must feel themselves to be unqualified. The obvious tendency of the educational measures which have been so successfully carried out by the Pharmaceutical Society has been to diminish the extent to which indiscriminate prescribing is practised by Pharmaceutists, who have no medical qualification. Yet there are still many instances in which a large amount of what is called counter-practice is carried on by Chemists. In some localities the principal part of the business of the Chemist consists in prescribing for the poor, who, if deprived of this cheap means of obtaining remedies for their ailments, would either be deprived of all medical relief, or would be thrown into the hands of the worst description of quacks. It is an important point for the class of Chemists referred to, to determine how far they are legally justified in prescribing and charging for the medicines they supply, and this question has been recently discussed in a contemporary publication, the *Chemist and Druggist*, which has a large circulation among, and is considered, to a great extent, to represent the interests of, the Chemists referred to. The proprietor of that publication has gone to the expense of obtaining a counsel's opinion with reference to the right of Chemists and Druggists to prescribe; and the case is so fairly stated, and the opinion so entirely in accordance with the views set forth in our pages, that we give here the questions and opinion for the benefit of our readers:—

"QUESTIONS.

"1. Has a chemist, &c., a right to mix up at his shop, for a patient, a medicine which the chemist considers fit and proper for the case?

"2. May he, if sent for, attend a patient for that purpose?

"3. In either case, is he entitled to recover the value of his medicines if he supply the same on credit?

"4. Is there any criminal liability attaching to a chemist, &c., who in dispensing medicine to a casual customer, commits an error through ignorance of the patient's constitution; if the disorder, which the regular medical attendant of the patient might have alleviated, prove fatal through the want of knowledge on the part of the chemist of previous symptoms of the particular case?"

The following opinion has been received on these points:—

"OPINION.

"1. I am of opinion that a chemist may, in his shop, so far prescribe for a customer as to advise with him as to the nature and quality and mode of application of the

medicines which he is about to sell, and also as to which of his commodities will best suit the requirements of his customer. He may listen to his customer's statements as to the reasons for his wishing to become a purchaser, and may suggest to and advise him as to which of his commodities will be most suitable and beneficial to the customer, or may dissuade him from purchasing or taking that which a customer in his ignorance may have applied for. This advice is merely incidental to the sale and dispensation of the chemist's wares and drugs, and cannot, of course, be made the subject of *a charge*.

"2. I should say that in no case can a chemist *attend upon a patient* or customer at the house of the latter, for the purpose of giving him advice or of *seeing him*, so as to be able to form an opinion as to the mode in which the chemist should prescribe for or supply his patient with medicines. Of course, a chemist may go to his customer's house to take an order for specific goods from the customer, if the latter send for him, he being too unwell to go out, just as any other tradesman may do.

"3. In either case a chemist may, of course, recover for goods sold by him on credit; he is no more compelled to deal for ready money only than is any other tradesman. But, in all cases, the chemist must be simply a '*vendor of his goods*,' in no way seeking to make a *profit* by the *advice or recommendation given by him*. It seems to me, upon the whole, that the system which is called "counter-practice" is perfectly legal.

"4. I am of opinion, that a chemist who does no more than what I have suggested he may legally do, is no more liable to criminal proceedings than is any other practitioner. He makes no professions, does not hold himself out in a false position, and if he acts *bonâ fide* with ordinary skill and ability, not being guilty of gross negligence, he stands in about the same position as any other medical practitioner. I have not thought it necessary to cite any authorities; but I believe the history of all the professions, and all the cases on the subject, are collected and referred to in 'The Attorney-General *v.* The Royal College of Physicians,' 30 Law J., Chanc. 757.

"2, *Essex Court, Temple, Nov.* 12*th*, 1861. "TOMPSON CHITTY."

In the last sentence of the third paragraph of the above opinion, which states "*it seems to me, upon the whole, that the system which is called 'counter-practice' is perfectly legal*," of course the term "counter-practice" is used in the sense defined in the context.

The importance of our adhering to the spirit of the law, and not attempting to avail ourselves of any apparent laxity in the terms used to express it, was forcibly pointed out in an article which appeared in this Journal, in July, 1855, from the pen of the late Editor, Mr. Jacob Bell, with the reproduction of which we shall conclude this notice.

"Those who take advantage of any apparent laxity in the restrictive operation of a law, and exert their utmost ingenuity, while keeping within the letter, to violate its spirit and intention, are not advancing the interest of the class to which they belong. On the contrary, they may unintentionally produce an effect directly opposite from that which they desire, by affording practical proof that the law is not sufficiently stringent, and thus giving a pretext for the introduction of one which may be less easily evaded. For example, we have frequently had occasion to resist the attempts which have been made to define the limits between the functions of the Apothecary and those of the Pharmaceutist, in such a manner as to be injurious to the latter class; and it is now generally admitted, that some discretionary power must be conceded to the public, as well as to the members of our own body, in determining where the line shall be drawn. The Pharmaceutical interest is concerned in proving that the confidence thus reposed in its members is not misplaced, and that no further restrictions are necessary. Those Chemists who endeavour to sail as near the wind as possible, who have '*consulting rooms*,' who '*prescribe gratis*,' and (whether on their own premises or not) *perform all the functions of medical men*, are not the friends of their class. They may be compared to schoolboys, who are allowed to walk through an orchard with the understanding that they may take a few windfalls from the ground; but not satisfied with this privilege, some of them take advantage of the opportunity to strip the trees, and thus cause the door of the orchard in future to be closed against their companions and themselves, or only opened under much more strict regulations."

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *6th November*, 1861,

Present—Messrs. Bird, Bottle, Brady, Bucklee, Davenport, Deane, Edwards, Evans, Hanbury, Haselden, Herring, Hills, Lescher, Mackay, Meggeson, Morson, Sandford, Savage, Squire, and Waugh,

Mr. David Davies .....CARDIFF

was elected a **MEMBER.**

ERRATUM.—Page 251, line 10, *for* Brady *read* Bottle.

MAJOR EXAMINATION, 20*th November*, 1861.

Coles, John William .....Camberwell
Ferneley, John William .....Grantham
George, John Evan .....Newcastle Emlyn
Spearing, James .....Southampton

MINOR EXAMINATION.

Dale, George William .....Chichester
Hodder, Alfred .....Bristol
Maxwell, George Neal ....Biggleswade
Taylor, George Spratt .....Harrogate

REGISTERED APPRENTICES.

NAME.	RESIDING WITH.	ADDRESS.
Bird, Charles John	Mr. Bird	Worcester
Jeffery, Henry	Mr. Sharland	Bristol
Priestley, Henry	Mr. Priestley	Sheffield
Sells, Robert James	Mr. Wilson	Canterbury
Wadsworth, Richard	Mr. Booth	Rochdale
Walker, Samuel	Mr. Wilson	Sheffield

PHARMACEUTICAL MEETING.

Wednesday, November 6th, 1861.

MR. PETER SQUIRE, PRESIDENT, IN THE CHAIR.

THE following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced, and the thanks of the Society given to the respective donors thereof:

Illustrations of the Nueva Quinologia of Pavon. Parts VIII. and IX. By John Eliot Howard, Esq. From the Author.

Zoognosia Tabulis Synopticis Illustrata. By Dr. G. Fischer. Vol. I., Moscow, 1813. From Mr. J. N. W. Brewer.

Bulletin de la Société Botanique de France. From the Society.

Journal of the Society of Arts. From the Society.

Proceedings of the Linnean Society. From the Society.

Notices of the Proceedings of the Royal Institution. From the Institution.

List of the Members, &c., of the Royal Institution. From the Institution.

The Quarterly Journal of the Chemical Society. From the Society.

Répertoire de Chimie. From the Editor.

The Dental Review. From the Editor.

The Educational Times. From the Editor.

A Sketch of the Studies of the Medical Student. By Professor Bentley. From the Author.

Specimen of the Ordeal Root, from Goumbi, West Africa. From Mr. P. L. Simmonds.

A Hornets' Nest. From Mr. G. W. Sandford.

Professor Bentley stated that the Ordeal Root presented by Mr. Simmonds had been described by M. Paul du Chaillu. In certain parts of Western Africa an infusion of it was given to persons accused of witchcraft, and those who recovered from its effects were declared innocent. It was supposed to be the root of a species of *Strychnos*, and, judging from the character of the bark, &c., he thought that there could be but little doubt that it was either derived from a plant of that genus, or from one nearly allied to it.*

PRIZES FOR HERBARIA.

The prizes for herbaria, the award of which was announced at the meeting in October, were then distributed as follows:—

Silver Medal.....Mr. James Browne, Coventry.

Bronze Medal .....Mr. Joseph H. Richardson, Plymouth.

The following paper was read:—

ON MEDICINAL EXTRACTS, TAKING BELLADONNA AS AN EXAMPLE.

BY PETER SQUIRE, F.L.S.,
President of the Pharmaceutical Society of Great Britain.

In many officinal preparations we find that there is considerable discrepancy between the processes directed to be used by the Pharmacopœia and those actually employed by manufacturers on a large scale. The dispensing Pharmaceutist may be very conscientious about his Pharmacopœia, but if his extracts are supplied to him with a label P.L, that is all he actually knows about them.

The manufacturer does not strictly follow the directions of the Pharmacopœia, he employs the process which gives the best result, in the most direct manner. Now, up to the present time, I believe, that in some cases at any rate, the manufacturer who has desired to produce a good article has employed a better process than that given in the Pharmacopœia, probably, because he has had more practical experience than the framers of the Pharmacopœial formulæ.

Of all the officinal preparations, perhaps the extracts from the fresh herbs furnish the most striking example of this difference between precept and practice, and as the subject of the preparation of extracts has lately again occupied my attention, I have ascertained how far the practice of the manufacturer has differed from the directions of the Pharmacopœia, and to what extent he has succeeded in the quality of his product.

I may observe, that the Pharmacopœia of 1851 profited by the experience of the manufacturer, for previous to that date the plants were ordered to be sprinkled with water; the manufacturer had already dispensed with the water, and the Pharmacopœia followed the example.

The question which I wish to discuss this evening, is, whether medicinal extracts from green herbs are best prepared from leaves only, or from all the soft parts of the plant taken together? The Pharmacopœia has for many years

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* The root has since been analysed by Mr. John Attfield, of St. Bartholomew's Hospital, and by Mr. C. H. Wood, in the Pharmaceutical Society's laboratory. Both analyses exhibited abundant evidence of the presence of *strychnine*, but no traces of *brucine*.

ordered leaves only; the manufacturers, as I shall presently show you, have employed the whole of the soft parts of the plant.

At present, I have only been able to test one plant. This opportunity was afforded me a short time since, by finding a quantity of belladonna which, on account of the severity of the winter, had only arrived at perfection at the end of September. I found it in full leaf and vigorous, partly in flower and partly in fruit. The plant was cut and conveyed to the laboratory without delay. It was trimmed—that is, the large and woody stalks were cut off and rejected. The leaves from 100 lbs. of this trimmed plant weighed 64½ lbs., and when bruised and pressed, yielded 34 lbs. of juice. The chlorophyll was separated; the juice was then coagulated, and the weight of the albumen thus precipitated weighed in its moist state 5½ ozs. The remaining juice, mixed with the chlorophyll, was then evaporated, and yielded 5 lbs. 3 ozs. of extract. The weight of the remaining soft parts, including flowers and fruit, was 35½ lbs., producing 18 lbs. of juice, 1 oz. of albumen, and 1 lb. 11 ozs. of extract.

The first of these extracts became mouldy in ten days; the second still remains perfectly good. An extract made of the whole plant, trimmed, also keeps well.

Before proceeding further I will give you the information that other manufacturers have kindly, and without reserve, afforded me. (Mr. Squire then read letters from Messrs. Allen, Herring, Holland, and Ransom, all large growers of medicinal herbs, or makers of extracts on an extensive scale.) These letters uniformly stated that the extracts made with the leaves *only* grew mouldy in a few weeks, whereas when made with the soft parts of the whole plant they would keep perfectly well, and remain of a good consistence, from one season to another.

It appears, from the experience of all manufacturers, that the juice of the stalks, &c., on account of the gum it contains, is indispensable to the preservation of the extract. The consistence is also greatly improved by it, and in the case of belladonna a plastic tenacious extract is what we require, and not one that either shrinks and becomes hard and unmanageable, or else moulds and spoils; for it should be remembered that we have to make a plaister as well as ointment with it.

But then comes the question, Is the extract made from these other soft parts equal to that of the leaves in power? To ascertain this, I made solutions of the same strength, of the extract of the leaves, and of that prepared from the other parts. The solution from the stalks, &c., was marked *A*, that from the leaves *B*. These solutions were put into the hands of several gentlemen for experiment upon the pupil of the eye; and by noting the time each required to dilate the pupil, and the degree of dilatation, they were able to ascertain which of them acted most powerfully. I may mention, that I have received reports from Dr. Garrod, who says that in twenty cases the results indicated that solution *A* possessed a decidedly greater power of dilating the pupil of the eye than solution *B*. Mr. Dixon, of Portman Square, says that he has only been able, from the short notice that I gave him, to try it in a few cases, but he would say that the solution marked *A* was more efficacious than that marked *B*. Mr. White Cooper had not tried the solutions sufficiently to satisfy himself in giving an opinion, and wanted more time. Mr. Streatfield gave a decided opinion in favour of *A*. Mr. Robert Taylor, of the Central London Ophthalmic Hospital, says the solution *A* acts much more rapidly and energetically upon the pupil of the eye than that marked *B*. Mr. Wordsworth decides in favour of *A*. All, therefore, agree, that solution *A*—viz., that made from the stalks—is the more active.

We cannot, therefore, I think, resist the conclusion, that the extract from the young stalks, flowers, and fruit, taken together, is really the better extract of the two; and although we may condemn the practice of disobeying the Pharma-

copœia, we cannot but regret that directions should have been given, which entail upon the manufacturer the loss of at least one-third of his produce, yield a less efficient preparation, and one that is of a bad consistence, and that will not keep longer than a few weeks.

In looking back into former Pharmacopœias, we find no mention of preparations corresponding to extracts from the green plants until 1746, when the leaves of rue and those of savine were ordered to be employed for the purpose, and were directed to be *boiled, strained*, and evaporated. In 1788, an extract of hemlock was first ordered, but here the whole plant was directed to be taken, then bruised, and the juice expressed and evaporated with care; then, in 1809, these preparations, which had previously been styled inspissated juices, were installed as extracts, and the hemlock (together with aconite, belladonna, and hyoscyamus, now for the first time introduced), were all ordered to be sprinkled with water before pressing out the juice. But for reasons with which we are not acquainted, the *leaves only* were ordered to be employed. However, Dr. Powell, the authorized translator of that edition, is by no means explicit about the matter, for in his remarks on these extracts, he says: "The texture of the *plant* is first destroyed by bruising, and its juice expressed is then evaporated." The College also directed that a small quantity of rectified spirit should be sprinkled on all the soft extracts. The Pharmacopœias of 1824 and 1836 followed exactly the steps of their predecessors, and, in the latter edition, the translator adds to the remarks of Dr. Powell just quoted, the words, "to prevent its becoming mouldy."

Mr. Deane said that, having in a small way had some years' experience in the preparation of extracts from green herbs, he had always found such to keep well if evaporated at a temperature below that which caused coagulation of the so-called albumen; but if evaporated at any temperature below 212° capable of producing coagulation, such extracts rapidly became mouldy and spoiled, unless the coagula were removed previous to evaporation. The albumen might be retained, however, without danger of the extracts spoiling by mouldiness, if the evaporation were conducted by a boiling process in open vessels. He said that he had also found that extracts made in vacuo, by the usual form of apparatus, were equally liable to spoil from the same cause, for, although the temperature of the bulk of the liquid might be kept during such a process much below the point of coagulation, yet coagulation did take place perfectly in the course of a very short time, in consequence of the particles of the liquid coming successively and rapidly in contact with the heated sides of the pan, which, by the action of the steam employed, probably reached a temperature little short of 212°. Brief as the space of time must be in which each particle remained in contact with the heated metal, it was quite sufficient to effect coagulation, but not to cook (if such a term might be used) the coagulum, consequently the extract would not keep. A somewhat analogous result occurred, he said, in those extracts which contained no chlorophyll, as those of poppies and liquorice, when evaporated at a low temperature, that was to say, at a temperature below the boiling point of water. After a few weeks, or at most a few months, a kind of fermentation took place in them, which frequently doubled the original bulk of the extract by the generation and liberation of a gas. This occurred after coagulation and filtration of the liquid, yet it did not happen when the evaporation was conducted by continuous boiling in open vessels. Much of the efficiency, elegance, and keeping properties of green extracts must depend (Mr. Deane added) on the condition of the plants when gathered, and whether they had or had not been allowed to become heated by lying in heaps before being operated upon. Mr. Fortune, in his account of the cultivation of the tea plant in China, had said, that the only real difference between green and black tea was, that when the former was to be made the

leaves were operated upon immediately they were gathered, but when the latter, they were first laid in heaps to become heated before going into the pans. So we found in the preparation of our extracts from green herbs, if the plant was in a proper stage of development and was operated upon immediately it was gathered, an elegant, green, and efficient preparation might be expected; but if, as was commonly the case with large quantities of herbs brought into London, they became much heated, the result was sure to be a dark-coloured and inelegant preparation, whether its active properties were affected or not. Again, if the plant was in a vigorous state of growth, all its tissues very succulent and imperfectly developed, and the inflorescence not commenced or only just coming out, there would be found, mostly, and especially in wet seasons, a large quantity of chlorophyll and albumen, the latter giving the extract a greater tendency to become mouldy, and the former a mealiness or tendency to crumble, quite at variance with our notions of a good pill mass, and, moreover, as he believed, less efficient than when prepared from plants more advanced, in which the inflorescence was about one-third over, and some of the fruits well formed. We might, *a priori*, infer that such plants would afford a more satisfactory result, as from the more perfect development of the tissues we might reasonably infer the more perfect and greater development of the active principles; at all events, experience seemed to confirm this idea.

Mr. Deane added, that having stated thus much, he would say a few words more to urge upon those young men who were intending to follow the profession of Pharmacy, the importance of cultivating a knowledge of Botany, especially structural and physiological Botany, as such would have a most important bearing on their future interest, by enabling them to recognise species, distinguish one part of a plant from another, ascertain the conditions under which the different parts had been gathered and preserved, and many other points bearing on the efficiency of the remedies they had to prepare. From the great improvement that had taken place of late years in the preparation of many compounds on a large scale, it was obvious that this kind of knowledge had been brought to bear directly or indirectly on our largest and best manufacturers; and as success had followed such knowledge in these instances, so it would in others. Botany was a study fraught with the most lively interest in all its branches, and if pursued with an earnest desire after truth and a determination to make the most of it, it could not fail to enrich the mind with a vast store of interesting as well as useful knowledge available on all occasions; while at the same time it would enable any one to pass agreeably and usefully many an otherwise weary hour, by converting every hedge, lane, field, heath, and common we met with in our rambles, into a beautiful and delightful garden, which without such knowledge would appear to the mind as a dreary and desolate waste.

Mr. Cracknell stated that he had for some years paid much attention to the preparation of extracts from fresh plants, and could add his testimony to the accuracy of the remarks on the manufacture of them made by Mr. Squire. In his experiments on these substances his object had always been to obtain an extract which should contain the active principles of the plant in an undecomposed and as concentrated a form as possible, and at the same time one which would remain unchanged for a period of a year or more; because, however strong and good an extract made from a plant which was in a proper condition once only in the year might be, if it would not keep for twelve months or more it was practically useless. With the view of adhering to the instructions of the Pharmacopœia, he said, he had repeatedly made extracts from the leaves only of fresh plants, and these extracts when first made had a great advantage in appearance over most others, but he found they uniformly changed in a short time, some crumbled and cracked, and the air being thus admitted into deep fissures the whole mass was soon traversed with mould; others dried and became

very fœtid, and covered with crystals. It was most satisfactory to have learnt that evening that the extract prepared from the soft stalks and flowers of belladonna was, at least, as active as that made from the leaves only, for not only were the fine stalks of great assistance to the manufacturer by dividing the pulpy mass which the crushed leaves formed, and thus facilitating the process of expressing the juice, but he was of opinion that no extracts made without them would ever remain unchanged for any considerable period. From the experiments described by Mr. Squire, it appeared that the extract made from the soft stalks and flowers of belladonna was even stronger than that prepared from the leaves only. He had found, however, that extracts made from the soft parts of plants, from which the leaves had been stripped off, absorbed moisture from the air, became soft very quickly, and then underwent a species of fermentation. He believed that the absence of chlorophyll was the cause of this, and probably the excess of that substance in the leaves was partly the cause of the changes that took place in the extracts made from them only. After more than twenty years' experience in the manufacture of extracts regardless of cost, he had no hesitation in stating, that the best extracts from fresh plants were those which were made by crushing together the leaves, flowers, and soft and fine stalks, expressing the juice, and at once evaporating it to a proper consistence at a temperature sufficiently low to prevent injury to it.

Mr. Francis said, that in making extracts from the green herbs, such as those of belladonna, conium, and hyoscyamus, he had always been in the habit of using the whole plant. He operated as follows:—The plant was first bruised and pressed, and the juice thus extracted was evaporated as quickly as possible, in a steam pan at a boiling temperature, to the consistence of treacle; the extract in this state was then finished off to a proper consistence, by being placed in shallow dishes and exposed to the sun. At the commencement of the boiling, he also said, that he skimmed off all the matter that rose to the surface of the liquid. Extracts thus prepared he found kept their consistence and properties for a length of time; whereas those made from the *leaves only*, as directed by the Pharmacopœia, he had always noticed to become mouldy and ferment. By following the Pharmacopœial directions, moreover, there would be a great waste of ingredients, and thus there would necessarily result an increase of price. Mr. Francis added, that he had some extract of hyoscyamus which had been made from the whole plant as far back as the year 1853, that still retained its aroma and consistence.

Mr. Haselden observed, that he had seen very good extracts prepared according to the directions of the Pharmacopœia, and had not known them to become mouldy; the difficulty with such extracts was, that they required to be made very stiff, or the pills prepared with them would not keep of a good shape. This was especially the case with extract of henbane. Many years ago (at least twenty) the juice was evaporated almost spontaneously in very shallow dishes and at a very low temperature; but this plan was abandoned, as it was always eventually found necessary to reduce the extract by means of a water-bath to get it of a good consistence. He was not prepared to say that an extract made from the *leaves only* was stronger than that prepared from the young stalks and leaves taken together; but, commercially speaking, it would be more advantageously prepared in the latter way. In reply to a question put to him by the President, Mr. Haselden said that the statement he had just made upon extracts prepared from the leaves only of green herbs, was founded upon an experience of more than eight years.

Mr. Brady said that, without laying any claim to thirty years' experience, he might be allowed to make one or two remarks. One of the previous speakers had stated that extracts prepared from leaves only speedily became dry and friable; now all must have noticed that when this dry condition occurred, the

surface of the extract was frequently covered with saline crystallization. This might be simply due to evaporation, but it might, and he believed it occasionally did, mark a sort of incipient decomposition ; in any case, it was a most undesirable condition in which to have a medicinal preparation, and if it were more likely to result from the use of the leaves only, it was additional testimony in favour of the views which had been expressed in the paper by Mr. Squire. There was one point on which further information was desirable, though it belonged to the subject generally rather than to the particular division of it now under discussion, and that was as to the proportions of juice and extract yielded by plants in wet and dry seasons, and the variation of the medicinal value of the extract traceable to such influences. Before sitting down, he would just add one word in confirmation of what had been said by Mr. Deane relative to the value of botanical studies to the practical Pharmaceutist. On this matter he could speak not only from personal experience, but from having had facilities for observing the result in others, and he concurred in every word that Mr. Deane had said. The knowledge resulting from an intelligent study of plants, such as was evinced by the Apprentice who had forwarded the remarkable collection of dried specimens which had so justly earned the silver medal offered by the Council for British plants, could not fail to yield ample return, whether in business or pleasure, in after life.

Mr. Heathfield stated that in the year 1831 he was engaged in a course of experiments in the laboratory of the late Mr. Battley, with a view of ascertaining the qualities of the juices of narcotic plants generally, and one of those which came under his notice more particularly was *Conium maculatum*. He said, that in order to arrive at a conclusion as to the best mode of preparing the extract, he took the juice obtained from various parts of the plant, viz., from the leaves; from the buds and softer parts; from the stalk cut towards the lower part of the herb; and from the entire plant itself. On removing, by means of heat, the albuminous matter and chlorophyll, and placing this in dishes, in the course of twenty-four hours it showed in the warm laboratory (in summer) a tendency to ferment; whilst, on the other hand, the liquid remaining after the separation of these substances did not ferment for some days. The quantity of this albuminous and chlorophyll separation was much greater in the juice from the leaves and buds than in that from the stalks of the plant, and the disposition of the juice from the leaves to ferment was much greater than that of the juice from the coarser part. In seeking for the cause of this phenomenon he was led with Mr. Battley to examine the constituents of the juice, and they found that in six gallons of that of conium, corresponding to about three-quarters of a hundred-weight of the fresh plant, there existed 119 grains of hydrochloric acid, combined with a base, and corresponding to nearly 200 grains of chloride of sodium, supposing that to be the base, or to about 250 grains of chloride of potassium, if that were the combining metalloid. The property that alkaline chlorides had in assisting the solubility of albumen was well known, and it was clear that as there was more of the albumen and chlorophyll in the leaves and buds, so was there less chloride of the alkali in proportion in those parts of the herb. On evaporating the liquid remaining after the removal of the matters separated by heat, as explained, the extract produced appeared to have little tendency to decompose or mould, whilst those inspissations which contained the largest quantity of the albuminous and green matter appeared to mould very rapidly. It was for those who had examined the juice expressed from different parts of the plant, with a view to their therapeutic qualities, to offer an opinion on that point, but it might be presumed that, at any given time, the whole of the juice throughout the stem and leaves was in one uniform condition, with the exception that there was more chlorophyll in the leaves and buds than in the stem, the other constituents remaining the same. The quantity of the separation

which took place from the juice of the entire plant, raised to a temperature of 130°, was 5½ oz. (when dried at a low heat) from six gallons of the juice.

Mr. Davenport observed, that it was a very opportune and interesting circumstance that the President should have selected belladonna for experiment at the present time, as the supply of that herb both last year, and at the proper season this, had been very limited. The extract was consequently scarce, and high in price. It had happened this year, however, that the medicinal herb under notice had been abundant in the autumn, and yielded a large supply of extract. Then the question arose whether this extract (made as it were out of season) possessed the same active properties as that obtained in the summer. It was interesting to hear from the President that this had been practically tested by Dr. Garrod and others, all of whom found that the properties of extract as thus prepared in the autumn, were fully developed. This fact was a most important one, as it would entirely remove any doubt which might have hitherto existed upon the matter, and we might conclude from these experiments, that the autumnal extract this year was equal to that prepared in former years at the usual period in the summer. The elucidation of such points showed the importance and great practical value of their evening meetings.

Mr. Bottle stated that the preparation of extracts from green plants was a pharmaceutical subject which he had but little opportunity for obtaining practical information upon; he felt, however, much interested in the discussion which had taken place that evening. They were much indebted to Mr. Squire for the introduction of his highly important and interesting paper, which had been the means of eliciting so large an amount of practical information from gentlemen who had taken part in the debate, and whose experience in the manufacture of extracts rendered their remarks so valuable. From observations that had been made, he gleaned that extracts of a green colour, from the presence of the chlorophyll, and probably a considerable portion of the albuminous matter with it, did not keep so well as extracts of a darker colour, and it had also been observed that extracts made from plants that had previously become a little heated, were always of a dark colour. By association of these observations, it occurred to him that a new field for investigation and inquiry was opened. He would ask, Was it to be inferred that extracts made from plants which from previous close packing had slightly heated, kept better than those from the fresher plant which contained all the colouring matter? If so, did this arise from the coagulation of the albumen and chlorophyll by the heat spontaneously generated prior to the extraction of the juice and their retention among the fibrous matter upon expression? Again, to what extent can this fermentation process be permitted without altering the medicinal properties of the product? He was induced to make these inquiries from observation of the change produced in vegetable matter in the process of haymaking, and its effect upon the lower animals. A small amount of fermentation was here essential, and eliminated a vast increase of nutrient property, by the conversion of starchy into saccharine matter, but carry this process a little further, and you obtained a product far less nutritious than the original grass, and not only this, but also containing properties highly deleterious to the animal economy.

Mr. Holland said, that having had a large experience in making extracts, he would especially urge upon the makers of such preparations the great importance of using the herbs for that purpose in as fresh a state as was possible. By so doing, they would prevent all danger of the herbs heating; for if such should occur, which was very liable to be the case in warm weather, when they were packed in heaps and kept for any length of time, the quality of the extract would be much deteriorated. It was his practice to make up the herbs into extracts as quickly as he could after they were brought in from the fields. Such extracts would keep perfectly well and of a good consistence from one season to

another, if prepared from the whole of the young parts, but if made according to the directions of the Pharmacopœia from the leaves *only*, they would speedily become spoiled. No extract, he repeated, would keep, unless the young herbaceous parts were taken with the leaves.

Professor Bentley said, that at that late hour he should only make a few observations upon the very interesting subject which had formed the topic of discussion that evening. He thought that such practical papers as the one just read by the President were those upon which the opinions of the Members of the Society were especially desired, in order that the framers of the Pharmacopœia might know how the preparations required by them were prepared by the manufacturers. Although he could not speak practically as a maker of extracts from green herbs, he could say that he had taken some pains to ascertain how they were made by others on a large scale, and all the evidence he had collected went to show that the young stems and leaves taken together were used for the purpose, because if the leaves were alone employed, as directed by the Pharmacopœia, the extracts prepared from them would become mouldy in a very short space of time, and as such extracts could only be made at certain periods of the year, if they would not keep from season to season, such a direction could not be followed. Professor Bentley said that he also wished to impress upon extract-makers the necessity of using the herbs in as fresh a state as possible, for, if they were packed in heaps and kept for any time before being used, so as to become heated, as was frequently the case when they were obtained from a distance, the quality of the extract and its capabilities of keeping were much diminished. Before sitting down, he would state that it must not be supposed, because good extract of belladonna had been prepared successfully on a large scale during the last autumn, that this was the best time generally for that purpose. As a rule, the autumn-made extract was inferior to that prepared earlier in the year—that was, at the usual period in July. The present year was altogether an exceptional one, for the severe frosts of last year had done so much damage to the belladonna plants that they were scarcely fit for use this year till the middle or end of September, and, moreover, the remarkably fine and dry autumn had been most favourable for their growth, and thus good extracts had been then made from them. In conclusion, Professor Bentley said, that he was indebted on this occasion to Mr. Ransom, for some practical information on the best time for collecting herbs and preparing extracts from them.

Mr. Hills said that he merely rose to corroborate the statement made by the President in his excellent paper, and also to bear testimony to the observations of Mr. Deane and of Mr. Cracknell. He regretted that Mr. Gale, the superintendent of his laboratory, who could speak more fully on the subject, was prevented by a family bereavement from attending the meeting. Mr. Hills quite coincided with Mr. Deane in his opinion that the operation of inspissating the juice could not be successfully carried on in a steam pan at a low temperature, for although the bulk of the juice was then kept at a temperature below 100° or 120°, yet the particles by coming in contact with the hot sides of the pan, had a part of their albumen coagulated, which was not the case when the juice was evaporated by means of a water-bath, where the temperature could be preserved between 80° and 100°; when the resulting extract was found to keep perfectly. Mr. Hills also agreed with the observation of Mr. Francis, with respect to inspissating large quantities at a high temperature. The President having done him (Mr. H.) the honour to ask for the average results of products from belladonna for the last two or three years, he begged to state that the leaves and softer part of 1 cwt. of belladonna plant produced—1859, 1 lb. 9½ oz.; 1860, 1 lb. 10½ oz.; 1861, 2lbs. 4 oz., at a temperature below 100°. In reply to a question from the President as to the amount of the stem thrown away, Mr. Hills said that he thought about three-quarters of every cwt.

At the request of several Members, the President announced that the discussion upon the above paper would be resumed at the next evening meeting in December. He hoped on that occasion to see as good a meeting, and listen to as interesting and important a discussion, as they had had on the present evening.

Mr. Furley, of Edinburgh, then exhibited his "Process for rendering Pills Tasteless." The plan adopted by him was as follows:—He took two saucers; smeared the inside of one of them with the albumen obtained by well agitating the white of an egg; and in the other, he put a fine powder composed of equal parts of white sugar and tragacanth. Some pills were then placed in the first saucer and made to revolve in it, by which they speedily became coated with a thin film of albumen; they were then instantly transferred to the other saucer, and upon being made to revolve as before, they became covered with the mixture of tragacanth and sugar, and were thus rendered tasteless. It should be noticed that this process of Mr. Furley's is protected by a patent, but a licence may be obtained from the patentee by the payment of a small sum.

Mr. J. Attfield exhibited and explained Casella's Mercurial Minimum Thermometer. A description of this appeared in our last number.

PHARMACEUTICAL MEETING, EDINBURGH.

The First Scientific Meeting of the Society in Edinburgh for Session 1861-62, was held in George Street Hall, on Wednesday Evening, 14th November. There was a large attendance.

Mr. Ainslie, President, on taking the chair, delivered the following

ADDRESS.

Gentlemen,—On taking the chair as your President for the Session 1861-62 allow me to return you my sincere thanks for the honour conferred—an honour entirely unsolicited, and therefore more highly appreciated. When I reflect upon the high social and scientific position of many of my predecessors, I certainly feel my own insufficiency, but knowing at the same time that I shall receive the able and willing assistance of my colleagues in the Council, and also of our energetic Secretary, I trust that the interests of the North British Branch of the Pharmaceutical Society will not sustain injury during my term of office; at least, gentlemen, I can assure you that I shall do what lies in my power to promote its advancement.

Allow me to make a few observations on the past, present, and future prospects of the Pharmaceutical Society of Great Britain. This little word *past* calls forth many a tender reminiscence, for who amongst us can think of the beginning of the Society without remembering the labours of Jacob Bell, who may in a word be called our founder. For, as has been said repeatedly, he was the chief actor then, not only by his energetic and sensible leaders in the *Pharmaceutical Journal*, but also by his able papers at Pharmaceutic Meetings and plain common sense addresses delivered to most of our town and country Members. John Fletcher Macfarlan, too, has passed away, having left us a worthy example of kindness, urbanity, and anxiety for the promotion of our Society. We are daily reminded that here our time is very short, therefore let each of us, however humble our position as Pharmaceutists, throw in our individual contribution towards the advancement of our common object. Let each of us strive to follow the example of these noble men who have gone before us, let each cultivate a spirit of self-denial, and throw his energies, be they small or great, into the scale of progress; we must not halt, as we shall be urged on by the advancing intelligence of the age. Rest assured, if Pharmaceutists would keep pace with the times, they will need to be banded together as one man for the advancement of their profession. On what does the soldier rely when he goes into the battle-field? Does he for an instant suppose that all his energy will avail if not seconded by his comrades? No! It is the discipline he has undergone which

he exemplifies in his advance upon the enemy; nerved by confidence in his commander he goes forth into the foray with the feeling that he is thoroughly supported by his fellows, it is this that steels his heart and strengthens his arm for the encounter. It is a similar feeling that we need to have infused into the mind of every Pharmaceutist, that we may go forward with irresistible power, so that the fortresses of ignorance may be completely dismantled. Nor would we forget the ble assistance of our former Presidents and Members of Council in London, many of whom, although now no more, it is still our duty to acknowledge. Many Members of onr Society, too many, who have had no experience in the management of so great an Institution as ours, are apt to overlook the amount of time bestowed on its business, yet I trust there are not a few who very highly appreciate their services. We have only time to glance at a few of the difficulties of the past. We obtained the Incorporation by Royal Charter in 1843, the Pharmacy Bill in 1852, and were threatened with a Poison Bill in 1858. The first has answered its purpose, the second has given us the option of styling ourselves Pharmaceutical Chemists, but no further protection from any merchant who chooses to deal in drugs or chemicals. With regard to the Poison Bill, it was defeated, and justly so, as it was found utterly impracticable. Twenty years have now passed away since the establishment of our Society, and how much in that interval has been effected by us for our advancement? I apprehend a great deal, and if any person doubts this let him look at the questions put to our young men at the London examination board, and the complete system there adopted, which is, I hesitate not to say, inferior to none in Britain or elsewhere. There can be no doubt that, as a class, we have made rapid strides in scientific acquirements since this Society voluntarily commenced to improve our knowledge in the sciences of Pharmacy, Materia Medica, and Botany. We have now constructed one of the finest laboratories in the world, and with the same able Professors as we have had for many years, we have good reason to be proud of our present position, as compared with the disunited and unscientific condition in which we were twenty years ago. A slight check has been given lately to our progression, in consequence of our too great anxiety to make everything at Bloomsbury Square as perfect as the demands of the present age require.

This is to be regretted, as I think we might have managed to have gone on as we previously did without spending so freely as we have lately done, and thus incurred an outlay which has constrained the Council in London to suggest an alteration in one of the Bye-laws regarding the admission of Members to the Society—an alteration which I feel assured would never have been dreamt of, had not the present pressure excited a sudden sympathy with those who *have all along done nothing towards the formation and support of the Society*. I am convinced this is only a temporary inconvenience. If we would all stand firm, and take no apprentice who refused to join the Society, we should very speedily increase our numbers, and require even more accommodation than we possess for their education; although it is right to mention that many of us do not act up to this principle, partly from an unintentional supineness, and partly from the difficulty of convincing the guardians of our apprentices of the great utility of the Society—which circumstance operates greatly in limiting our increase. The friends of young men too frequently object to the expense of the Society, as they are aware that the assistant's remuneration, after a servitude of five years, is not commensurate; and in many cases even the master Chemist has a great deal of hard work and poor remuneration for the laborious duties of his business. Were the terms of admission to the Society lowered, I am positive that we would have two for one who now wish to join us; and we must ever bear in mind, that it is to the vigour and energy of our young men that we must be indebted for our future eminence and extension as British Pharmaceutists. When those of us who are now struggling to forward Pharmacy and to prevent its degeneracy have passed away, these are they who will erect the fabric to a height not dreamt of by us who have been its founders.

What can the Pharmaceutical Society do for me? is a question frequently asked. This, gentlemen, is a narrow way of looking at the subject; let us be above such selfish views of personal aggrandizement, and look at the sacrifice of time and money made by medical practitioners, to alleviate the sufferings of their fellow-creatures. Let any sordid spirit who doubts this go to the most destitute parts of

our city, and observe the untiring zeal of our greatest and best physicians, who not only give them the benefit of their great professional skill, but in many cases have impoverished themselves by their Christian liberality. It refreshes one, in these days of hard competition, to think of men with these noble qualities striving to fulfil the commands of the Great Physician.

I would ask the question, Are we not all attachés of the practitioners of medicine? The Physician may prescribe as the result of his great experience—he may recal all the knowledge of his earliest days—he may consult the highest authorities in his profession, ancient or modern; but what avails this knowledge if the Pharmaceutist, from ignorance, destroys his most efficient remedies? I think, with deference, we have all along underrated the importance of the position we hold in forwarding the cause of the practice of physic; and I fear that the profession have not encouraged us sufficiently to assist them. Depend upon it, the more knowledge we possess in our own department of Pharmacy, the less shall we wish to interfere with the Physician's domain, for my friends here will at once admit how anxious we are all to adhere to our own business, and to carry out its details with completeness and fidelity.

Let me ask, then, if there shall still be a number of Chemists and Druggists who shall continue to hold the ignoble position of keeping aloof from our Society, and thereby retarding our efforts by their apathy?

We shall now glance at the agreeable prospect of having a National Pharmacopœia, a work in which the deepest interest is taken by every Chemist; and we cannot doubt when so many able men, not only belonging to the medical profession, but also to our own Society, are connected with its production, that we shall have a work which, from its uniformity and exactness, will be of immense advantage to every Pharmaceutist. What a comfort to us all that we shall then be enabled to dispense an English, Irish, or Scotch prescription, without the fear of receiving a rebuke from a customer about the difference in taste, colour, and smell of a tincture, decoction, or infusion. What a privilege that we shall know at a glance that *our* hydrocyanic acid and our solution of morphia, &c., are exactly of the same strength in the three kingdoms; instead of having hydrocyanic acid nearly double the strength of the London acid, and our solution of morphia half the strength, as at present. And that we shall then understand what is meant by an *ounce* and a *pound*, and not be annoying ourselves to recollect whether the troy or avoirdupois weight is intended.

We lie under a debt of deep gratitude to our townsman, Dr. Charles Wilson, for his successful labours in this direction. We believe that the National Pharmacopœia will be published during some early month of next year, and we have no hesitation in stating that it will constitute the most important work of its class that has been published in our day. It will one day seem passing strange to our successors how we were able to get on at all without it, and were enabled to conduct dispensing, &c., without committing serious errors.

We would now glance at a few new remedies that are at present coming into use. Among these are podophyllin, a tincture of *Actæa racemosa*, Quillai bark, and solution of tannin in glycerine, which have been recently brought under our notice by Mr. A. F. Haselden in the *Pharmaceutical Journal*, and I am sure we feel obliged to him for such notices. I believe we might have dozens of hints from our brethren, did they not think them too trivial to forward to the Journal; and although I would not wish to be understood as decrying that excellent periodical as a whole, yet I do think we might have articles more suited to our Members. In my opinion, the articles bearing on strictly scientific subjects are too numerous, and we have, generally speaking, *too few papers on our every-day duties in the laboratory.*

I have now to offer a few remarks regarding the proposed alteration of the Bye-laws of the Society, relative to the admission of future Members.

"Admit all the outsiders who have previously refused to avail themselves of the extra time allowed by the Pharmacy Act, and by that means you carry all the trade with you, and, besides, get the benefit of their annual subscriptions, and if you go to Parliament for a new Pharmacy Bill, you will be more likely to be listened to than if you had these men for your enemies," says one of our brethren. "Lower the rate of admission to those who pass the present examination, and charge an annual subscription," says another.

It is unjust to us who have passed the examinations, and were at considerable expense in our education, to admit these outsiders now to be on an equality with us; "it is breaking faith with us," says a Major Associate. Now, gentlemen, if it will not be detaining you too long, I shall give you *my view* of the case, and, if I mistake not, the view that is entertained by the majority of my brethren in Scotland, and I am much mistaken if not also in England. I would admit all who prove themselves worthy by passing an examination. It will probably be asked, What kind of an examination can you expect middle-aged men to pass who are rusty in chemical symbols and the advanced state of the chemical knowledge of the present day? My answer shall be very short and decided to this query. Let them be examined on their knowledge of the actions and uses of medicines, on the reading of prescriptions, and on their practical pharmacy; and I have no doubt that, although most of those I have spoken of would be at sea in the strictly scientific part of their business, yet they would acquit themselves to the satisfaction of their examinators; *always taking into consideration the large amount of experience they have had in the usual routine of their business.*

When they have passed this examination, let them pay a reduced fee on admission, and the usual fee of one guinea annually, as the Members have latterly been doing. At the same time, let it be ascertained that the fee on passing, whatever that may be, is sufficient to maintain the efficiency of the Society. Should these suggestions be objected to, I trust that our brethren will come forward handsomely, *give a double subscription for one year*, to make up for these too expensive alterations that have lately been completed.

I am happy to observe that the Jacob Bell Scholarships have been competed for, and gained by Messrs. Tolbert and Tilden, and hope that we may yet hear more of the career of these gentlemen, and that they will fulfil the high expectations formed of them.

A bust of Jacob Bell has been obtained, and, through the liberality of Mr. Hills, the Society is to be presented with a marble bust as well.

Before sitting down, allow me to ask you, my young friends, who are serving and studying for our business, to be diligent and persevering in your studies, and to avail yourselves of every opportunity afforded at our scientific meetings for increasing your store of knowledge, as we expect to have many eminent men to assist us at these meetings, with papers on subjects not strictly connected with our profession, yet bearing on the present and future well-being of you all.

I would also remind you to take advantage of our excellent library, which contains the best works in almost every department of science, but more especially suitable for our own business; I do assure you, my friends, many students would be glad to have such an opportunity of improving themselves. Let me finally urge you to cultivate respect to your seniors, and show to those around you that the diligent student and active man of business can, at the same time, be a man of gentlemanly and courteous habits, and so become an ornament in every position in which it may please God to place you.

On the motion of Dr. Stevenson Macadam, seconded by Mr. John Mackay, thanks were tendered to the President for his address.

Professor ARCHER, Regius Keeper of the Edinburgh Industrial Museum, then addressed the meeting as follows:—

When I remember that you have been already addressed by my most able and painstaking predecessor, by Dr. Christison, with his immense knowledge of pharmaceutical science, and by many others of great competency, I not only feel misgivings as to my own special abilities, but am impressed with the not agreeable conviction that it is scarcely probable I can allude to any appropriate subject which has not been already placed before you by more competent individuals. I have, however, accepted your kind and flattering invitation, and trust that my willingness in endeavouring to meet your wishes will be taken as some amends for my deficiencies. Hoping that I have a majority amongst my hearers of the younger class of pharmaceutists, I shall specially refer, in the remarks I have to make, to their position as members of a rising profession; and shall hope that most of them are rising members of that profession, which is, I believe, destined ere long to take a much more import-

ant position than it has hitherto done. Having for years watched with great interest the exertions of my lamented friend Mr. Jacob Bell, and the little band who so warmly co-operated with him, I am quite aware of all that has been done in behalf of establishing pharmacy as a scientific profession in Great Britain; and feeling sure that you are equally well acquainted with those facts, I will not intrude upon you with any history of the past.

You will, however, allow me, I hope, to state my opinion of the present and future prospects of British pharmacy. I wish to do this, because very much has been said respecting the difference between the Continental system and our own; and almost always the inference has been drawn in favour of our neighbours and against ourselves. I do not think, however, that this view of the case can be sustained; on the contrary, a fair comparison of the two sides of the question will, I feel sure, result in the proof that, in the new phase which British pharmacy has assumed, there is more of real usefulness, more freedom for intellectual expansion, and more reason to hope for great results, than in the much boasted system of France, which from its general diffusion may be called the Continental method. Moreover, although, as compared with the old system, which I hope is rapidly dying out in this country, the French system was immeasurably superior, yet it must be borne in mind that nothing of the kind could have been established here, without the devouring flames of revolution had destroyed the growth of former ages, and cleared the ground for new institutions to spring up; fortunately we have a method of holding faithfully on to the framework of our old constitution, and gradually adding to it those changes which time and circumstances dictate. Those who wished the total change from the old system of chemists and druggists, to the newer and infinitely preferable one of certificated pharmaceutical chemists, did not take the trouble to consider the injury and injustice it would have inflicted upon thousands of hard-working respectable men, who had no other fault than that of being born a few years too soon. The present, which I hold to be a transition state, will, I trust, in time alter this state of things; and those who now commence life simply as chemists and druggists after the old method, will have no just right to complain if the movement so fairly commenced should end in that proper recognition of the profession of pharmacy, which would fairly annihilate their pretensions, and rob them of all just cause for complaint. Now the Continental system is particularly clumsy in one respect—it separates the dealer in drugs from the compounder of materia medica, and it prevents the regular medical practitioner from in any case supplying the needful medicines, whatever the emergency, each party being liable to penalties for an infringement upon the province of another. In large towns the dispensing by surgeons is not necessary or desirable, and should for many reasons be discontinued, as it happily is in this city ; but the separation of the dealer from the compounder of drugs would now be felt an unendurable hardship and inconvenience.

It is of the very first importance that the certificated pharmaceutical chemists should feel that in the partial recognition which our Government has accorded to them, they have received that one talent which must not be buried, but must be judiciously employed, in order that it may be made to work out steadily and surely the further requirements of the profession. Young pharmaceutists must, by a diligent cultivation of the advantages offered to them, teach the public the value of the new order of things ; and it is incumbent upon this and every branch of the parent society to prove to the public the value of this change which has been so far wrought. Then, when the confidence of the public has been secured, there will be no difficulty of obtaining what I think should be the steady aim of every pharmaceutical chemist, the establishment of colleges in each division of the kingdom, with compulsory examinations and diplomas, and with penalties for unauthorized practitioners.

Another great advantage is possessed by the British pharmaceutist, which is not shared by those on the Continent. It was most ably pointed out to this Association, in a former address by Dr. Christison, that the sale of drugs was not an expansible one ; on the contrary, he showed that as modern medical sciences brushes away the errors of our forefathers, the wholesale administration of medicines rapidly decreases ; therefore it might be assumed that the number and importance of the pharmaceutical body must decline. Such is clearly not the case, for owing to the freedom from State control, the pharmaceutical chemist can add many useful

branches to his practice. He can cultivate his talents, and if successful, as many have been, he can aspire to analytical chemistry—he engrafts the kindred art of the perfumer upon his own—and the wonderful development of photography has opened up a fresh and lucrative trade in a new class of chemicals. And these, as you well know, are only a few of the many little additions by which the pharmaceutical chemist is enabled to make his calling more profitable than if it were confined to the mere sale of prescribed medicines. The next point to which I wish to direct your attention, is the necessity for greater intellectual activity, and the development of such genius as will draw the eyes of the public upon the pharmaceutical body. I know the old argument about long hours, &c., will be held up, but I do not believe in its force ; thousands of great minds have been brought to light by struggling with greater difficulties than any of those which beset the young pharmaceutist. It is true this is a most difficult question, and my own argument may be brought against me, for great minds have been brought out without any other aid than the stimulus which a battle with difficulties has created, and without any systematic help ; nevertheless, I believe in the value of systematic assistance, and watchful care on the part of masters over their apprentices, and firmly believe a little kind direction, and well-timed indulgence is never thrown away.

But it is in the united action of this and similar associations that the largest amount of good is to be hoped for, and some personal experience in this matter enables me to speak with confidence. A system of prizes is of immense value. In a very active and useful branch of the Pharmaceutical Society of Great Britain—the Liverpool Chemists' Association—of which I have long had the honour of being an honorary member, not long since one of its Presidents very liberally offered a student's microscope as a prize for the best set of microscopic preparations of drugs and chemicals, the competitors to be apprentices of members of the Society. As one of the judges in that competition, I am enabled to say, that it was a source of great gratification and agreeable surprise to my colleagues and myself to look over the numerous sets of objects prepared by the competitors ; and so creditable were they all, that we had no trifling difficulty in deciding which should be the winner. Now it is beginning to be well understood that in the discrimination of drugs the value of microscopic examination is of the utmost importance ; indeed, it is indispensable to perfect accuracy, and is the unfailing detector of sophistication. Again, prizes for proficiency in botany, chemistry, and materia medica are of the utmost value in stimulating an industrious study of those most important branches of pharmaceutical education. Long hours, though to be greatly deprecated, are no obstacle; I have proved this, for when I was lecturer on botany in the medical school, Liverpool, many of my very best pupils were apprentices of pharmaceutical chemists who availed themselves of the privilege of admission extended to that body. My lectures were at seven in the morning, and I often found that even before that early hour they had had a long walk, and made acquaintance with their subject in the fields, bringing the results in their vasculums. Such young men, I believe and hope, are to be the great levers of progress for the Pharmaceutical Society of Great Britain.

In the address delivered to this Association in 1859 by my predecessor, Dr. George Wilson, he said—" No one can fairly object to the prominence given to chemistry, for there can be no question, that if a pharmaceutical novice were allowed to study one, and only one, of the various sciences which throw a light on pharmacy, his wisdom would be shown in selecting chemistry." I have rarely seen cause to differ in opinion from my lamented friend; and if, like him, I looked only from the chemical point of view, I probably should not, even now ; but having made economic botany the study of my life, and especially the materia medica plants, I regard it from a different point of view, and believe the student in pharmacy would best show his wisdom in selecting materia medica as the branch of science to which he might most profitably devote his energies, even though he discarded the chemical portion of the usual materia medica studies. My reason is this: the pharmaceutist is the proper person to select and prepare the mere drug, the virtues of which have been ascertained by the therapeutist, often, in fact generally, without the slightest reference to chemistry; and as, in most cases, it is of exotic origin, and liable to great sophistication if valuable, a thorough knowledge of its history and properties is of the greatest importance; whereas, the chemical

portion of the materia medica is all of home manufacture, and is the work of the professional chemist; besides which, the definite nature of chemicals renders them very much less liable to adulteration, the detection of which is easy in such cases. There is nothing to prevent the pharmaceutical chemist from being the manufacturing chemist as well as the analytical chemist; but they are not often combined in one, and when they are it is usually as wholesale merchants.

Not only is the knowledge of drugs, in my opinion, of the greatest importance to the pharmaceutical chemist, but I think that knowledge should not be confined to those only which are described in the pharmacopœias of our own country. The intelligent pharmaceutist should make himself acquainted with the drugs of other countries, and prepare them for the investigation of the therapeutist, otherwise the chances of increasing our knowledge in this direction are almost limited to accident. Now, there is really a very wide field open to the intellectual pharmaceutist in the comprehensive medical botany of India and the States of America (I wish I could call them the United States). I mention these two especially, because their pharmaceutical preparations and drugs are very numerous, but I doubt not something of value might be obtained from every country. One great essential to a society like this is a museum and library; the former is an expensive affair, and requires constant attention. The Liverpool Chemists' Association has formed an admirable one, but its great difficulty is the management, as its funds will not admit of the employment of a curator. The same society has also an admirable circulating library, in which all the best works on pharmacy and chemistry are available for the use of its members. I do not know if you have done anything in this direction; but, if you have not, I would strongly advise you to concentrate all your energies upon examinations, prizes, and a library. Leave the museum to me, for I hope ere long to be able to say to you that the Industrial Museum of Scotland contains a fine collection of materia medica and chemicals, entirely available for the study of the Pharmaceutical Society of Edinburgh, and all other aspirants to the knowledge of materia medica. Its acquisitions in this direction have been very large, and thanks to that ornament of your profession, Mr. Daniel Hanbury, and Dr. Squire, and other eminent Chemists and Pharmaceutists of London, we are likely before long to be exceedingly rich in this branch. I need hardly say that we have been very deeply indebted so far to Dr. Christison, who has largely contributed specimens of Indian materia medica. Before I close, there is still another subject to which I feel bound to refer, as a duty incumbent upon all who address this Association, and in this case my remarks are intended for the senior Members. It is an oft repeated suggestion, indeed almost a hackneyed one. I allude to the short-hour movement. I am not prepared to enter into all the arguments *pro* and *con.* of this much-vexed question. It has been before you for years, and it has been impressed upon your minds by your own honest convictions that the change sought is a reasonable and proper one, and that it is but a simple act of justice which sooner or later must be accorded. I can therefore only add my earnest entreaty that this question may be taken into consideration as one in which longer thinking is not only useless but is an absolute fault, and that the energetic action necessary to carrying it out may no longer be delayed. In the town from whence I came, and to which I fear I have already too often alluded, it is not now common to find a respectable chemist and druggist's shop open after half-past seven; and I do not believe any one of those who have conformed to this plan is a farthing poorer, or that the public are in the slightest degree inconvenienced. The shops must be closed sooner or later in the evening, and when the public know that a time is fixed, people will arrange accordingly. Doubtless there is an occasional emergency requiring attendance; but if the public is made aware that only such cases will be attended to, little unnecessary trouble will be given. Good sense and justice both demand it, and I am sure at your hands will soon receive it.

Professor Archer, whose address was loudly applauded, particularly at the close, then exhibited to the meeting, as a curiosity, a Chinese teapot made of native red sulphuret of arsenic (realgar), used, he stated, for the administration of minute doses of arsenic as a specific. The teapot was neatly put together of small pieces, and showed a bright red colour and fine polish. It was partly lined with tinfoil, apparently to regulate the dose. It had just been presented to the Museum by Mr. Daniel Hanbury.

On the motion of Mr. YOUNG, a vote of thanks was unanimously given to Professor Archer.

Mr. MACKAY then exhibited specimens of poison and dispensing bottles made by Mr. Toogood, of Mount Street, London; as well as a specimen of the recently proposed slipper-shaped poison bottle, invented and produced by Messrs. Gilbertson and Son, of London. With these the meeting appeared to be well pleased, but no opinion was expressed as to the probability of such bottles being generally adopted by Dispensing Chemists.

The Board of Examiners for Scotland will meet on the Second Wednesday of January, 1862, in 51, George-street, at 11 o'clock, A.M.

Intending candidates for admission are requested to communicate with the Secretary, in order that the necessary arrangements may be made.—*John Mackay, Edinburgh, 22nd Nov., 1861, Local Secretary.*

ORIGINAL AND EXTRACTED ARTICLES.

NOTES ON CHINESE MATERIA MEDICA.

BY DANIEL HANBURY, F.L.S.

(*Continued from page* 264.)

知母 *Che-moo*; Rhizome of *Anemarrhena asphodeloides* Bunge (*Liliaceæ*); Tatarinov, *Catal. Med. Sinens.*, p. 16; *Pun-tsaou*, fig. 97.

A rhizome, the size of the little finger (fig. 15), occurring in pieces often four inches long; the upper side is flattened, or even somewhat channelled, beset with coarse, adpressed, ascending, rufous or yellowish hairs, which pass into scales at the once growing extremity, where also the remains of a stem rising at a right angle from the rhizome sometimes occur. The under side is convex, and covered with thick radical fibres, or more usually with their scars. The drug has but little taste and smell: it is brought from the province of Shansi. The plant is enumerated by Maximowicz in the Flora of Pekin.*

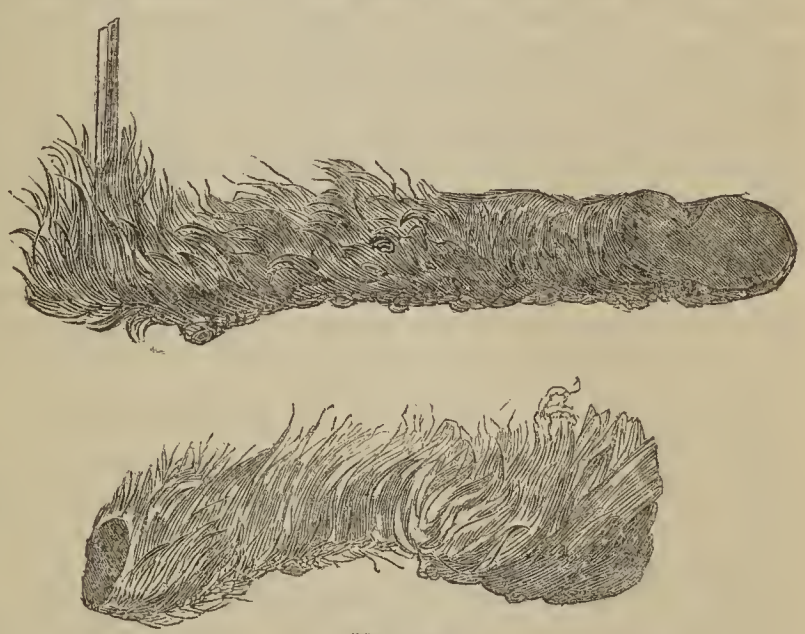

FIG. 15.

於朮 *Yu-shŭh*; Root of a plant of the nat. ord. *Umbelliferæ?*

Contorted fleshy roots, anteriorly about $\frac{3}{8}$ of an inch thick, but lower down swelled into nodular tubers, an inch or two in diameter, covered everywhere with a wrinkled brown skin; internally they are of a pale rusty colour, moist and easily cut, and have an aromatic odour and sweetish aromatic taste.

川芎 *Chuen-keung*; *Czuan-siun*, *Rad. Levistici?* Tatarinov, *Catal. Med. Sinens.*, p. 15.

Nodular masses consisting apparently of the rootstock of some umbelliferous plant allied to Angelica. The specimens are from $1\frac{1}{4}$ to $2\frac{1}{2}$ inches in diameter,

* *Primit. Flor. Amurens.*, p. 478.

having a very irregular, rough, brown, outer surface, and a pale yellowish-brown, cavernous interior.

The odour of the drug resembles that of the root *Tang-kwei* (next described). A decoction of these two roots is taken daily by the Chinese women for some time previous to childbirth, under the idea that it diminishes the dangers incident to such a state.

當歸 *Tang-kwei;* Root of *Aralia edulis* S. et Z. (*Umbelliferæ*), *Flora Japonica*, tab. 25; *Doku quatz*, vulgo *Dosjen*, Kæmpf., *Amœn.*, p. 826; *Pun-tsaou*, fig. 155.

This is a fleshy branching root, in size, shape, colour, and general appearance somewhat resembling gentian. It is internally whitish, has a sweetish, aromatic taste, and an odour approaching that of celery or angelica. It is said to be brought from the western provinces of China.

In Japan, according to Von Siebold, *Aralia edulis* is universally cultivated in fields and gardens, where it attains a height of three or four feet, flowering in August and ripening its bluish-black berries in November. It is valued chiefly on account of its root, which is eaten like Scorzonera, but the young stalks are likewise a delicious vegetable.

人參 *Jin-tsan;* Root of *Panax Ginseng* C. A. Meyer (*Araliaceæ*) *fide* Horaninow; *Pun-tsaou*, fig. 90; Ginseng Root.

The most esteemed variety of this famous drug is that obtained from Corea. but good qualities are produced also in Mongolia, Mantchouria, and other mountainous parts of the Chinese empire. The American ginseng imported into China is the root of *Panax quinquefolium* L.; it is much less esteemed than the native drug. Ginseng is regarded by the Chinese as the most potent of restoratives, and the finer qualities realize extravagant prices.* Its medicinal value appears, however, to the European practitioner entirely overrated, the root being simply mucilaginous, aromatic, and slightly bitter and saccharine.

升麻 *Shing-ma;* Rhizome of *Thalictrum rubellum* S. et Z. (*Ranunculaceæ*); *Szen-ma*, Tatarinov, *Cat. Med. Sinens.*, p. 53; *Pun-tsaou*, fig. 130; *Sien mâo*, Cleyer, *Med. Simp.*, No. 90.

It is said to be produced in the province of Shan-si.

茅慈菇 *Mow-tsze-koo.* The pseudo-bulbs of an orchideous plant; they are more or less ovate, shrunken, translucent, and horny; they vary in length from $\frac{1}{2}$ an inch to $1\frac{1}{4}$ inches.

光菇 *Kwang-koo;* Small bulbs resembling those of a Tulip; they are about $\frac{6}{10}$ of an inch long, smooth, and of a buff colour. The thin enveloping outer membrane has been removed; when cut, the external scale is seen to be very thick.

小環釵 *Seaou-hwan-chai*; Rhizome in size and form resembling that of *Triticum repens* (*Radix graminis*), of a bright yellow colour, tasteless, and inodorous. It is said to be derived from an aquatic plant inhabiting Cochin-china. I have not been able to identify the Chinese name, nor do I know the uses of the drug.

生半夏 *Sang-pwan-hea;* Tubers (tuber-buds) from the leaves of? *Pinellia tuberifera* Tenore (*Aroideæ*); *Arisæma ternatum* Schott, *Meletemata Botanica*, 1832, i., p. 17; *Pun-tsaou*, fig. 357?

Under the name of *Sang-pwan-hea*, there occur in the Chinese shops cer-

* See the interesting account of a Ginseng merchant contained in Mr. Lockhart's *Medical Missionary in China*, ed. 2, p. 107.

tain tubers (fig. 16) having the aspect of little balls about half an inch in diameter, flattened on one side, and in colour of a dirty white. More closely examined, we perceive on the flattened side a depression or sort of umbilicus, attached to which the remains of an enveloping membrane may sometimes be found. Around the depression, and extending over half the tuber, are a number of little pits. The tubers are brittle, yet soft enough to be easily cut with a knife. Their cut surface is perfectly white, and shows no trace of concentric layers, or other structure than an uniform mass of starchy, cellular tissue.

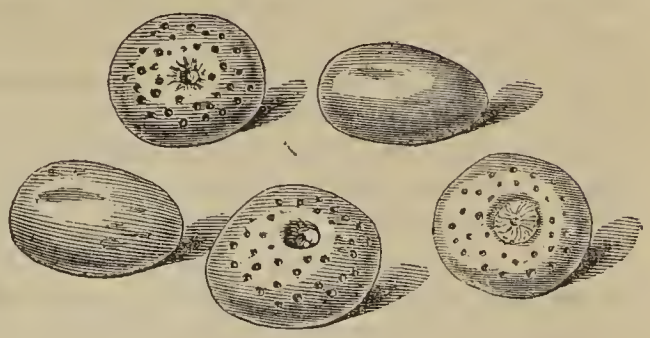

Fig. 16.

Mr. H. G. Schott, of Vienna, an authority of the highest eminence on *Aroideæ*, has obligingly examined these tubers, and has suggested that they are produced by *Pinellia tuberifera* Tenore, a plant of wide distribution in China, as well as in Japan.

The name *Pwan-hea* (*sang* signifies *crude*) appears to be applied to several species of *Arum*.

南星 *Nan-sing;* Tuber of *Arum pentaphyllum* L. (*Aroideæ*); Tatar., *Catal. Med. Sinens.*, p. 40; Cleyer, *Med. Simp.*, No. 88.*

Hard, whitish tubers, ½ an inch to 1½ inches across, of flattened spherical form, having a depression, generally surrounded with little pits, on the upper surface, marking the situation of the bud. Many of the larger tubers have smaller ones branching from them. In the dry state the drug has but little smell and taste; yet when chewed, even in minute quantity, it proves exceedingly acrid. Both Cleyer and Loureiro† enumerate many virtues ascribed to this drug, but they are too indefinite to merit much attention.

This drug resembles the preceding (*Sang-pwan-hea*), but the tubers of this attain much larger dimensions and are far less regular in form and size.

WOODS, BARKS, &c.

沉香 *Chin-heang;* Wood of *Aquilaria Agallocha* Roxb. (*Aquilarineæ*); *Chin hiam*, Cleyer *Med. Simp.*, No. 208; *Sinkoo*, Kæmpfer *Amœnitates*, p. 903; *Agallochum*, *Calambac*, *Agila Wood*, *Aloes Wood*.

The history of this celebrated substance, which is the *Aloes* or *Lign Aloes* of the Scriptures, is so replete with interest, that it is difficult to bring within due bounds even the most succinct account of it. I will, therefore, refer the reader who wishes for further information to the authors cited below.‡

It may in the first place be observed that this, the Biblical Aloes, has no relation with the extract now called by that name, and that it does not possess even the most well-known character of that drug—intense bitterness. Aloes wood is the produce of *Aquilaria Agallocha* Roxb., a tree of vast size, growing in the mountainous parts of Cochinchina, the Laos country, and adjoining regions, and extending westward into Silhet and Assam. The wood in its ordinary state is not valued as a drug, being pale in colour, light, and inodorous. But under certain conditions a change takes place in portions of both trunk and

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* *Flora Cochinchinensis*, ed. Willd., p. 652.

† The plant to which Kæmpfer applies these characters is the *Arum triphyllum* of Thunberg's *Flora Japonica*, p. 233.

‡ Guibourt, *Hist. des Drog.*, éd. 4, tome iii., p. 313; Roxburgh on the genus *Aquilaria*, *Linn Trans.*, vol. xxi., p. 199; Royle, *Illustrations of the Bot. of the Himalaya*, vol. i., p. 171; Loureiro, *Flora Cochinchinensis*, ed. Willd., p. 327; Kæmpfer, *Amœnitates*, p. 903; Finlayson, *Mission to Siam and Hué*, pp. 94-258.

branches, the wood becoming gorged with a dark, resinous, aromatic juice, and acquiring a greater specific gravity. It is these portions of the wood that constitute the drug in question, which is esteemed the more in proportion as it is ponderous and abounds in resinous matter. In Silhet, the collection of aloes wood is a precarious and tedious business; those engaged in it proceed some days' journey into the hilly districts, where they fell any trees they may find, young or old, and then, on the spot, search them for the *aggur*, as the valued wood is called. This is done by chopping off the bark and into the wood, until they observe dark-coloured veins, indicating the proximity of wood of valuable quality, which generally extends but a short distance from the centre of a trunk or branch. In this manner a whole tree is searched through, the collectors carrying away only such pieces as are rich in odoriferous resinous matter. In some districts it is customary to facilitate the extraction of the resinous wood by burying portions of the tree in moist ground, or by allowing the entire tree to remain a length of time after it is cut down, the effect of which is to cause decay in the non-resinous wood, and thus render it easily removable by an iron instrument. I have specimens of aloes wood in which this process has evidently been adopted. Aloes wood is sorted by the collectors into various qualities, the finest of which, called *Ghurkee*, is worth in Silhet from 12*s*. to 16*s*. per pound. As may readily be imagined, the drug occurs in pieces of extremely irregular shape and size; I have seen none exceeding a pound in weight, while some of excellent quality is met with as small chips and splinters. The larger pieces have mostly been scooped and trimmed with great care, so as to remove, as far as possible, all the less resinous portions. The wood is of a deep brown colour, marked more or less distinctly with innumerable coarse parallel veins loaded with resinous matter. A good sample yielded me 48 per cent. of matter soluble in rectified spirit. The wood has a slightly bitter, aromatic taste; its odour is peculiar and not remarkably agreeable; some persons compare it to sandal wood, others to ambergris. In the Bible we find it associated with other perfumes, as in the Psalms* and Proverbs† with cassia, or cinnamon and myrrh, in the Canticles‡ with spikenard, saffron, calamus, cinnamon, frankincense, and myrrh, and again with myrrh in the New Testament,§ where it appears such a mixture was used in embalming the body of our Blessed Lord.

In the present day, aloes wood is chiefly used in China, where it is principally consumed as incense. It is, however, to be met with in all Eastern bazaars, including those of Syria, where I have myself seen it for sale. In Silhet it seems to be chiefly collected for the sake of extracting from it a sort of essential oil or oleo-resin, which is obtained, according to one account, by distillation, according to another, by infusing fragments of the wood in boiling water, and collecting the "*uttur*" (oil) that rises to the surface. I have a sample of this *uttur* which has been prepared, as I judge, by the former process.

Aloes wood has long had a place in the Materia Medica of the Pharmacopœias of Europe, but the finer qualities of the drug have hardly ever been imported. It does not appear to possess any properties that call for its admission to modern medical practice.

牙香 *Ya-heang;* Wood of ? *Aquilaria Chinensis* Spreng. (*Aquilarineæ*); A light, spongy wood formed of coarse parallel fibres, devoid of aroma, but having a bitterish taste. I have referred it, upon the authority of Mr. S. Wells Williams,‖ to *Aquilaria Chinensis* Spreng. (*Ophispermum Sinense* Lour.), but with doubt, since the Chinese name given by Loureiro for that tree is *Pă mŏu yong.*

(*To be continued.*)

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* Psalm xlv., v. 8. † Prov., chap. vii., v. 17.
‡ Cant. chap. iv., v. 14. § John, chap. xix., v. 39.
‖ *English and Chinese Vocab.*, p. 103.

ON SOME APPLICATIONS OF CARBOLIC ACID, OR HYDRATE OF OXIDE OF PHENYLE.

BY DR. F. CRACE CALVERT, F.R.S.

Although carbolic acid has long been known to possess powerful antiseptic properties, its use has been delayed in medicine owing to the difficulty experienced in obtaining it in considerable quantities and in a state of purity,* as well as to the caution required in introducing new substances in that branch of science. The success, however, which has lately attended its application, will tend greatly to increase its importance as a therapeutic agent. It has been used with marked advantage in the Manchester Royal Infirmary by several of its distinguished physicians and surgeons. Thus, Dr. Henry Browne has given it in solution in water in cases of chronic diarrhœa with very satisfactory results. Dr. Roberts has applied it with very great success in the dose of one drop, in cases of vomiting, even after creosote had failed; he has also found it beneficial in cases of vomiting from dyspepsia, which disease is especially marked by pain after food. Mr. J. A. Ransome has used it for ulcers and other offensive discharges. Mr. Thomas Turner, in a note which he has communicated to me, speaks of carbolic acid in the following terms:—

"It may be advantageously used as a solution of one part of acid in seven parts of water, in fœtid ill-conditioned ulcers. It alters the action of the blood-vessels, causing a purulent instead of a sanious discharge, and destroys almost immediately the offensive smell of the secretion. The ulcers having a communication with carious bone, or even necrosis (where the bone is dead), it has in its diluted state a good effect when injected into the sinuses leading to the diseased bones. When there is mere caries or ulceration of the bone it effects the healing process, and in necrosis it promotes the exfoliation of the dead portion. . . In gangrenous and all offensive sores it removes all disagreeable smell and putrescency, and may render the discharge innocuous to the contiguous living and unaffected tissues. In its diluted state, therefore, it is a great boon to patients labouring under that class of disease."

Mr. Heath, house-surgeon of the infirmary, has used it with two parts of water as a lotion in sloughing wounds, and has found that in a short time after its application, it entirely arrests the sloughing process, and produces a healthy appearance.

Dr. Whitehead has used with advantage Dr. Robert Angus Smith's solution of sulphites and carbonates of lime and magnesia.

In July, 1859, M. Velpean drew the attention of the French Academy of Sciences to the value of the mixture of coal-tar and sulphate of lime of MM. Corne and Demeaux in the healing of ulcers and other offensive wounds, and it may be added, that this mixture was used with great advantage in the French army after the great battles of Magenta and Solferino.

In the following month I forwarded a note to the French Academy, pointing out that from experiments I had made with the various substances existing in coal-tar, it was highly probable that carbolic acid was the active agent of the coal-tar used by MM. Corne and Demeaux, and that much more certainty might be expected if that acid were substituted in their mixture, for the composition of coal-tar varies according to the nature of the coal, and the temperature employed in its preparation. I also suggested that it was probable that the powerful antiseptic properties of carbolic acid prevented the decomposition of the adjacent parts, and thus tended to restore the wounds to a healthy state, and to remove the cause of infection. Before quitting this part

* This acid is now prepared for medical purposes by the Tower Chemical Works Company, near Manchester.

of the subject, I beg again to call attention to a fact which I have already published in one of my papers, namely, that the addition of two or three drops of this acid to a pint of freshly made urine, will preserve it from fermentation or any marked chemical change for several weeks.

I have also applied it lately to foot-rot, which annually carries off large numbers of sheep, and I have been given to understand that the remedies hitherto adopted in this disease have been only partially successful. I think that if my experiments are further confirmed, it will prove a great boon to the farmers of this country.

This acid has also been applied by me during the last twelve months to the preservation of gelatine solutions and preparations, of size made with starch, flour, and similar substances, and of skins, hides, and other animal substances. In fact, its antiseptic powers are so great, that it is the most powerful preventive of putrefaction with which I am acquainted. It appears also to act strongly as an antiferment, for I have proved on an extensive commercial scale, that it prevents (as stated by me in a paper published in 1855) the conversion of tannin into gallic acid and sugar. It also arrests lactic fermentation. I am now engaged in a series of experiments to discover if that power extends to alcoholic, butyric, and acetic fermentations. I hope also to communicate to you shortly the results of my experiments on the protection of timber from dry rot.

ECLECTIC PHARMACY.

BY S. W. CLEAVE.

Some Pharmaceutists have been asked—many probably will be asked—what are "*Eclectic* Medicines?"—and if to this demand there be added some inquiries regarding the properties of "Leptandrin," "Iridin," "Macrotin," and "Caulophyllin," the pharmaceutist so questioned may possibly have to acknowledge his inability to furnish the desired information. To supply this anticipated want (which is the more likely to occur from the fact of these so-styled "Eclectic Medicines" having been placed before the public in a recent popular work) is my present object, as also to give a short account of the class of practitioners by whom these remedies were introduced. The word "*eclectic*" signifies *selected*, and *Eclectica*, which is an old medical term, means *selected medicines*. Under the head *Eclectica Medicina* in James's *Medicinal Dictionary* (London, folio, 1743-5), I find the following:—"*Eclectica Medicina*, from ἐκλέγω, to elect. Certain physicians among the ancients, of whom Archigenes was one, selected from all the other sects what appeared to them the best and most rational; hence they were called *Eclectics*, and their medicines were denominated *Eclectic Medicines*." The term, which had, I believe, become obsolete, has been of late years revived in America by a certain class of medical men, who have styled themselves "Eclectic" or "Reformed" practitioners, and who appear to have given rise to a class of Druggists calling themselves "Eclectic." This new sect is apparently not very cordially received by the profession at large: for a proposition made at the annual meeting of the American Pharmaceutical Association in 1859, to admit Homœopaths, "Botanic Druggists," and "Dealers in Eclectic Medicines," was adjourned for a year and then negatived. Being thus refused admission to the Association, the Eclectics have established schools and hospitals of their own, and have even commenced examinations and the granting of degrees. They seem not only to have revived the old term "Eclectic," but they also profess to carry out its principles, as stated in the before-mentioned definition, with the addition of the doctrine that remedies can be found in the vegetable kingdom suitable for all diseases, fulfilling all the requirements of the physician, and at the same time free from the alleged baneful effects which attend the exhibi-

tion of mineral remedies. In their search for vegetable remedies, they appear to have studied the older botanists, and also to have experimented on many plants, in order to obtain their virtues in a concentrated or otherwise suitable form for use, and for the determination of their medicinal powers. As a consequence of this, they have introduced a number of vegetable remedies, of which, as well as of the substances extracted from them, and their mode of preparation, I will endeavour to give a short summary.

The mode of preparing these substances is described by Mr. W. S. Merrill, in an essay entitled "Eclectic Pharmacy," published in the *Eclectic Medical Journal* for July, 1850. In that essay Mr. Merrill claims the "discovery" of certain active resinoid principles, and gives an account of their mode of preparation and uses. It may be illustrated by taking, as an example, the process recommended for preparing podophyllin, the best known in this country of these extracts. It is as follows:—Obtain a concentrated alcoholic tincture of the rhizome, add to it a large quantity of water, and distil off the alcohol. The water holds in solution the gum, mucilage, extractive and most of the colouring matter, while the active resinoid principle, being insoluble in that menstruum, subsides, and is collected, washed, and dried. One can hardly suppose that Mr. Merrill considers the process just indicated as his own invention, since it has long been followed in the preparation of jalapine and resin of scammony.* He may, however, be allowed the credit of being the first to apply the jalapine process to some other drugs. It is admitted that these precipitated resinoids are not chemically pure, but they are stated to be sufficiently so for medical use. As a consequence of their mode of extraction, their entire solubility in alcohol is stated to be the best test of their purity. The chief eclectic remedies which have been introduced into this country are the before-mentioned resinoids and certain herbs, roots, barks, and other preparations from them. I may remark that some of these remedies are but re-introduced, as, for instance, *Veratrum viride* and *Chimaphila*, both of which were in use before the modern eclectics made their appearance.

Chimaphila umbellata, natural order *Pyrolaceæ*, is officinal in the United States and London Pharmacopœias, being used as a tonic and diuretic. From it no active principle has been isolated, but it contains 18 per cent. of bitter extractive, in which, doubtless, its powers reside.

I may as well now add to the description of the mode of preparing podophyllin an account of its source. This is *Podophyllum peltatum*, natural order *Ranunculaceæ*, which is officinal in the United States Pharmacopœia, where a hydro-alcoholic extract is directed to be prepared, on which Parrish remarks that it is less used than it deserves, being equal to extract of jalap as to its cathartic effect, in half the dose. The eclectics refer its properties to its resinoid, podophyllin, which by them is stated, in the dose of from half to two grains, to be not only a valuable substitute for mercurials, but even to act on the liver more efficiently than any other drug.

For cimicifugin, or macrotin, which is prepared from *Cimicifuga* (*Actæa*) *racemosa*, natural order *Ranunculaceæ*, the eclectics claim tonic and nervine powers in dose of one to six grains three times a day. These characters are possessed also by the tincture, which is given in the dose of ten to forty drops for acute rheumatism, and in chronic cases to the extent of ʒj. to ℥j. It has been, for a long period, officinal in the United States, and has lately attracted great attention in this country. In female diseases the eclectics recommend cimicifugin to be given in combination with caulophyllin, the active principle of *Caulophyllum thalictroides*, natural order *Berberidaceæ*.

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* See Beaumé's *Elements de Pharmacie*, Paris, 1773, pp. 320-325.

Veratrum viride, belonging to natural order *Melanthaceæ*, is said by Lindley to be acrid, emetic, and powerfully stimulant, followed by sedative effects. It is used in America as a substitute for *Veratrum album*. According to the eclectics, it is one of the most remarkable remedial agents they possess, from its sedative action on the heart, in which it resembles digitalis, reducing the circulation very considerably, and without producing the evil effects which frequently follow the continued use of digitalis. The tincture is the form in which the eclectics administer it.

Leptandra virginica (*Veronica virginica*) natural order *Scrophulariaceæ*, was formerly officinal in the United States, and yields the impure resinoid, leptandrin, which is used as a cholagogue, in dose of two to four grains.

Hydrastis Canadensis, natural order *Ranunculaceæ*, yields hydrastin, a beautiful yellow powder with a bitter taste, used as a tonic, especially adapted for the treatment of dyspepsia and chronic inflammation of the stomach, in doses of three to five grains. There is also another preparation from the same plant, said to be the resinoid principle, and possessed of similar properties.

Sanguinaria Canadensis, natural order *Papaveraceæ*, yields an alkaloid, *Sanguinarina*, and a resinoid substance, called *Sanguinarin*. The alkaloid is used in the dose of one-thirtieth to one-tenth of a grain, and should be distinguished from the resinoid, of which half a grain to two grains are administered. The resinoid is used as a tonic and hepatic; the alkaloid for asthma. It is a singular fact, that the root is said to contain nearly as many chemical principles as opium.

The other eclectic remedies are not much known in this country, and being of much less importance, will require but a short notice. They are—

Ampelopsis quinquefolia, natural order *Vitaceæ*, yielding ampelopsin, used for scrofula and skin diseases.

Asclepias Syriaca and *A. tuberosa*, natural order *Asclepiadaceæ*, yields asclepine. The former is used for skin diseases, and the latter, with the active principle, are popular remedies for affections of the chest. Dose of asclepine, one to three grains.

Chenopodium anthelminticum, natural order *Chenopodiaceæ*, of which the fruits and essential oil from them are used, as the name would suggest, for worms.

Coptis trifolia, natural order *Ranunculaceæ*, has a place in the materia medica of the United States, and is used by eclectics as a tonic.

Cornus florida, natural order *Cornaceæ*, yields cornin, which, as well as the plant, is tonic and astringent, and said to be superior to quinine, in the dose of one to ten grains.

Corydalis formosa, natural order *Fumariaceæ*, active principle corydalin, which is used in syphilitic affections as a tonic and diuretic, in dose of one-half to one grain.

Cypripedium pubescens, natural order *Orchidaceæ*, so-called active principle cypripedin, said to act on the nervous system, in dose of half to two grains, or more.

Gillenia trifoliata, natural order *Rosaceæ*, is said to be a good emetic in dose of twenty to thirty grains.

Ilex opaca, natural order *Aquifoliaceæ*, active principle ilicin, which is used as a substitute for quinine in dose of twelve to twenty grains.

Iris versicolor, natural order *Iridaceæ*, active principle iridin, used for dropsy and jaundice, in dose of two to three grains.

Juglans cinerea, natural order *Juglandaceæ*, its extract is used as a laxative and purgative, in dose of ten to twenty grains.

Liatris spicata, natural order *Asteraceæ*, yields liatrin, which is reputed useful in disorders of the kidneys and Bright's disease; dose from four to eight grains.

Prunus Virginiana, natural order *Rosaceæ*, is officinal in the United States.

It, as well as its principle prunin, is used as a tonic, and to calm irritation of the stomach and nervous system.

Xanthoxylum fraxineum, natural order *Xanthoxylaceæ*, is a tonic and sialogogue.

I must now express my acknowledgments to Mr. E. Parrish for matter derived from his paper on Eclectic Pharmacy in the *American Journal of Pharmacy* and from his *Practical Pharmacy*; also to Dr. Gardner's new work on *Household Medicine*, from all of which I have freely extracted.

London, 23*rd November*, 1861.

THE NEW MERCURIAL MINIMUM THERMOMETER.

TO THE EDITORS OF THE PHARMACEUTICAL JOURNAL.

Gentlemen,—Your last number contains a description of a mercurial minimum thermometer constructed on a principle first brought forward by Mr. B. Stewart, of the Kew Observatory, viz., that a mercurial bulb connected with two capillary tubes of different sizes, will always expand into the larger, while contraction will only take place in the smaller tube. Giving full credit to Mr. Casella for the neat and ingenious instrument he has devised, there is a weak point in it which must detract much from its usefulness, and has stood in the way of earlier attempts to give a practical value to Mr. Stewart's experiment; for, no doubt, the thought has occurred to others, as it did to the writer long since, whether the fact announced by Mr. Stewart could not be turned to account in a useful instrument. There is little doubt but that the instrument described will register the minimum temperature, *provided there has been a constant fall from the time the instrumeut is set to the time of greatest cold;* it does not matter what amount of increase of heat there may be after that point has been reached, but any rise of temperature before the minimum is attained causes a virtual abstraction of mercury from the instrument at *b* (*vide* figure, page 264), and the thermometer will consequently register lower than the actual minimum temperature to a greater or less extent, in proportion to the quantity of mercury passed into *b*, and consequently, under these circumstances, which are as likely to occur any day as not, this cannot be a reliable instrument.

17, *St. Mark's Crescent*, 21*st Nov.*, 1861. W. Symons.

REPUTED SPECIFIC FOR SMALL-POX.

At the last meeting of the Epidemiological Society, a communication was read from Mr. Herbert Miles, Assistant-Surgeon to the Royal Artillery, respecting a plant that was stated to be a specific for small-pox. The remedy is given in the form of a strong infusion of the rhizome, and Mr. Miles had, after very considerable difficulty, succeeded in obtaining a small supply of the plant, which he had forwarded to the Society.

Mr. Miles is quartered in Canada, where an epidemic of small-pox having broken out among the Indians, the disease had proved virulent in the extreme among the unprotected, because unvaccinated, natives. However, the alarm had greatly diminished on an old squaw going amongst them, and treating the cases with the infusion. This treatment, it is said, was so successful, as to cure every case. The Secretary of the Society, Dr. McWilliam, C.B., had sent specimens of the plant to Dr. Hooker, of Kew, who pronounced it to be the *Sarracenia purpurea*, one of the pitcher plants of North America.

Mr. Marson, of the Small-Pox Hospital, has kindly undertaken to give the so-called remedy a trial.

REPORT OF THE RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION, AND OF THE APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

The Fertilizing Power of Guano.—M. Liebig, in a recent paper* on Peruvian guano, has given an explanation of the fertilizing power of this body, which will constitute a most important addition to our knowledge in agricultural chemistry. The action of guano is commonly attributed to the ammoniacal salts and the phosphates which it contains, nevertheless, it is well known that ammoniacal salts employed in a proportion equivalent to the nitrogen of the guano, are incapable of producing the same results. It is also known that a mixture of phosphate of lime in the state of powdered bones with ammoniacal salts, is incapable of rivalling guano, even although the latter may contain six or eight times less phosphate than the artificial mixture. Moreover, the fertilizing actions of these two manures are directly opposite; that of the guano is manifested during the first year and gradually declines; on the contrary, that of the mixture of phosphates and ammoniacal salts is weak at first, and increases with time. According to M. Liebig, the cause of these differences is the *oxalic acid* which the different qualities of guano always contain in greater or less proportion. As the result of a number of approximate determinations, he finds that this acid is always present in guano in inverse proportion to the quantity of uric acid, so that the more there is of the one, the lesst here is present of the other, and *vice versâ*. If guano be treated with boiling water, and the solution filtered and evaporated, an abundant crystallization of oxalate of ammonia is obtained, while the mother-liquor retains phosphate and sulphate of the same base. If, on the contrary, the guano be simply sprinkled with cold water and allowed to stand, the oxalic acid diminishes in the solution at the same time that the phosphoric acid increases, so that after twenty-four hours the liquid gives an abundant precipitate of phosphate of magnesia, and phosphate of magnesia and ammonia, on the simple addition of a salt of magnesia free from ammonia.

The action of the oxalic acid is thus explained without difficulty. It is not as a direct fertilizer that it acts, but it is by removing the lime from the calcareous phosphate, and so putting the phosphoric acid into the soluble form as an alkaline phosphate. Experience shows without doubt that oxalate of ammonia exerts but a very slight action on recently precipitated phosphate of lime; it is known, however, that the reaction becomes decided when an acid or some other agent is present to render the phosphate soluble. Now, that which sulphuric acid does in the manure, improperly called superphosphate of lime, sulphate of ammonia, which is always present, does in guano. Rendering the calcareous phosphate soluble, it enables the oxalic acid to act. This may be readily shown by an experiment. If a few drops of a solution of sulphate or hydrochlorate of ammonia be added to a mixture of phosphate of lime and oxalate of ammonia, after the lapse of a little time the lime is converted into oxalate. This decomposition, however, gradually ceases in natural guano previously moistened, and a point arrives at which the oxalic acid remains permanently in solution. M. Liebig conceives this to be due to the oxalate of lime accumulating round the particles of phosphate, and so protecting them from further action. If, however, the sulphate of ammonia be replaced by a few drops of sulphuric acid so as to communicate to the mixture a slightly acid reaction, then the formation of oxalate of lime is completed in a few hours, and the liquid is completely freed from oxalic acid, a corresponding quantity of phosphoric acid being found in its place. Acetic acid, or water charged with carbonic acid, are capable of producing the same result. These results were verified with a number of specimens of guano from different sources, and varying in composition. It results that the fertilizing power of guano depends not alone upon the proportion of nitrogen and phosphates present, but also upon the presence of oxalic acid.

On the Effect of Filtering the Air in Preventing Fermentation, Putrefaction, and Crystallization.—M. Schroeder has published the results of an investi-

* *Annal. der Chemie und Pharm.*, t. cxix., p. 11, and *Journal de Pharmacie.*

gation on the influence which the solid particles constantly floating in the air, exert in inducing change and decomposition in organic and other substances, and the effect of their exclusion on the preservation of such bodies. He has shown that the boiling of a liquid susceptible of fermentation or putrefaction in a flask closed with a plug of cotton wool, is sufficient in general to prevent any change; but that with certain substances, such as milk, yolk of egg, or meat broth, a different result is obtained. With these latter substances he finds that it is necessary to first heat them above the temperature of boiling water. Then, having introduced them into a flask and boiled them for a short time, if the flask be closed with a plug of cotton, and the heat withdrawn, they may be preserved unchanged. The same result may be obtained by maintaining the boiling for a very long time. When the liquid is simply boiled for a short time, no mycodermous growth is observed at the surface, as is the case when the substance is exposed to the open air; nevertheless putrefaction takes place. It must be concluded, therefore, that the ferment capable of provoking putrefaction existed in germ in the original substance, and that it was not destroyed by a temperature of 100° C. The author has carefully studied the growth and development of this putrefactive ferment under different conditions. His experiments were conducted, with a number of precautions, in an atmosphere of coal gas. He found that it was not developed in liquids susceptible of nourishing ordinary vegetable ferments, such as beer yeast; but that, on the contrary, it was propagated in the presence of albumen, casein, urine, &c. &c., caused the decomposition of these liquids, even when they had been previously heated to a temperature notably above 100° C.

M. Schroeder sums up the results of his investigation in the following series of conclusions:—

A series of phenomena of fermentation and putrefaction exist, which are due to the germs existing in the air, such are the alcoholic and lactic fermentations, mould, putrefaction of urine, &c.

Animal and vegetable substances contained in a flask closed with a plug of cotton wool are guaranteed against all fermentation, when all the germs within have been destroyed by boiling.

All the germs introduced by the air are killed by a short ebullition, but milk, yolk of egg, and broth, contain germs which are only destroyed by prolonged boiling or by a temperature above 100° C.

The germs contained in the latter substances are susceptible, even after prolonged ebullition, of inducing putrefaction and developing into vibrions of large size but little activity.

This putrefactive ferment is of an animal nature. It lives at the expense of albuminous substances, and does not multiply under the conditions which are favourable to the development of vegetable ferments.

The crystallization of supersaturated saline solutions is provoked by a kind of induction exerted by the surface of solid bodies.

The crystallization of the more soluble hydrated bodies is due to an induction less energetic than that which provokes the deposition of less soluble hydrated bodies. The strongest induction is exercised by the surface of a crystal of the same nature as the dissolved salt; but the more soluble salts are deposited slowly, while a less soluble body crystallizes immediately.

Supersaturated solutions, separated while hot from the external air by a plug of cotton, may be preserved a very long time, because the cotton prevents the access of the solid particles floating in the air. A simple shaking is without effect, unless, indeed, a certain part of the vase should possess the necessary inductive power.

The Action of Porous Bodies in Inducing Chemical Combinations.—M. B. Corenwinder showed some years ago that partial combination of sulphur and hydrogen may be effected by bringing the two bodies together in the presence of pumice-stone at a red heat. He has recently shown that the vapour of water may be also decomposed by sulphur, when some porous body at an elevated temperature is made to intervene. The experiment was conducted as follows:—Some fragments of recently calcined pumice-stone were placed in the middle part of a glass or porcelain tube; one end of the tube was then filled with pieces of sulphur, a plugget of asbestos being placed between the cork and the sulphur. A tube, by which steam

could be sent in, passed through the cork. The pumice-stone was then heated to redness, and the sulphur made to slowly volatilize. At the same time, a current of steam was cautiously sent through. After a little time, sulphuretted hydrogen was produced in abundance. A still more decided result is obtained if pure calcined silica be substituted for the pumice-stone. The porous body is totally unacted upon in all cases.

The author directs the attention of geologists to these results; he thinks that they may explain the presence of sulphuretted hydrogen in certain volcanic emanations.

Production of Chloride and Bromide of Cyanogen.—M. Langlois has devised a simple process for the production of chloride or bromide of cyanogen depending on the action of the respective radicals on cyanide of potassium. The following equation expresses, for instance, the action of chlorine on cyanide of potassium.

$$2\,Cl + K\,Cy = Cy\,Cl + K\,Cl.$$

If an aqueous solution of the metallic cyanide be treated with chlorine or bromine, the liquid becomes hot, deepens in colour, and ultimately disengages ammoniacal vapours, and deposits a black substance. By surrounding the vessel containing the solution with ice, the blackening is not developed, and the reaction takes place moderately and with accuracy.

For the preparation of gaseous chloride of cyanogen, a current of washed chlorine is transmitted through a flask one-fourth filled with a solution of one part of cyanide of potassium in two parts of water. The flask is surrounded with ice, and put into communication with a chloride of calcium tube followed by a U tube, which is plunged in a freezing mixture. The chloride of cyanogen condenses in this tube in fine colourless needles. After the operation, a notable quantity of chloride still remains in the flask; this is chased out by replacing the ice with water heated to 40° or 50° C., after the current of chlorine has been arrested.

For bromide of cyanogen the solution of cyanide is placed in a tubulated retort, surrounded with ice, and bromine allowed to fall in drop by drop from a vessel also cooled. The action is very lively; when a quantity of bromine equal to about two equivalents have been introduced, the tubulure of the retort is closed with a stopper, a receiver well cooled is adapted to the neck, and the ice which cooled the retort is replaced by water at 60° or 65° C. The bromide of cyanogen distils over, and is condensed in the receiver in long colourless needles. It may be thus obtained with rapidity and in abundance.

Extraction of Vanadium from Rutile.—M. H. Sainte Claire Deville states that vanadium may be extracted from rutile with great advantage. The following is the process which he recommends :—The rutile of Saint Yrieix is heated with three or four times its weight of hydrate of potash mixed with a little nitre. The mass, when cold, is powdered and treated with water; an alkaline solution of a green colour is obtained. The colour, which is due to manganese, is separated by the addition of alcohol. The liquid is filtered and treated with sulphuretted hydrogen, when it assumes a purplish red colour. A little titanic acid, and sometimes some coloured sulphides, are precipitated; the solution is filtered, exactly neutralized with hydrochloric acid, and slightly heated. When the sulphuretted hydrogen has disappeared, a brown powder separates, which is collected on a filter and roasted in a platinum vessel. A white crystalline sublimate is obtained, which is molybdic acid, and a fusible substance of a deep colour, which is the vanadic acid.

100 grammes of rutile furnish by this process 1.03 gr. of roasted sulphides, that is to say, a mixture of acids containing—

Titanic and stannic acids with the platinum of the vessel	0.211	gramme
Vanadic acid	0.323	"
Molybdic acid	0.486	"

M. Deville also states that the cerite of bätnas furnishes by this process, per cent.—

Titanic acid	0.05
Tellurous acid and traces of vanadium	0.51

Crystallized Manganate of Soda.—M. J. G. Gentele has obtained manganate of soda in a crystalline condition by the following method:—A crucible filled with a mixture of equal parts of powdered peroxide of manganese and crude nitrate of soda

having been exposed to the heat of a stone-ware pottery furnace during one baking, was found to contain on cooling a black fused mass. This mass was powdered, and treated with boiling water; an insoluble residue remained, having the appearance of hydrated oxide of iron. The liquid filtered through powdered glass, and allowed to cool, furnished a mass of crystals, almost colourless, presenting the acicular form of sulphate of soda, and containing

$$Na\ O, Mn\ O_3 + 10\ HO.$$

When these were dissolved in water they partially decomposed, and yielded a green solution. The crystals were dried on porous porcelain; contact with organic matter caused their decomposition.

Detection of Sulphurous Acid.—M. Boedeker points out that when sulphite of soda is added to a solution of nitro-prusside of sodium, a rose colour is produced. The coloration is much more intense when the nitro-prusside has been previously mixed with an excess of sulphate of zinc, and especially so if a small quantity of yellow prussiate of potash be added to the mixture. In this case the colour becomes purple. Acids and alkalies destroy the colour, but bicarbonate of soda is without action upon it. This reaction may be employed for the detection of sulphurous acid. Its delicacy is very great. Hyposulphuric acid and alkaline hyposulphites do not produce the results.

RESEARCHES ON HYPOPHOSPHITE OF LIME.

BY M. GÉRARD JANSSEN.

1. *Preparation.*

The hypophosphites are seldom met with chemically pure; this is due to those terrible explosions to which the most skilful operator exposes himself in their preparation; prompted by a well-grounded fear, he dares not conduct the process to the end, and the product obtained is more or less altered by foreign substances.

The properties attributed to such preparations cannot be those of the hypophosphites chemically pure. The author of these researches sought a new method of preparation, which would permit of obtaining these salts perfectly pure and without danger.

He first investigated the causes of explosion; these he found to be due to—1st, the action of heat, and the oxygen of the air on the phosphuretted hydrogen ($P\ H_3$); 2nd, the production of biphosphuretted hydrogen ($P_2\ H$); 3rd, the formation of a peculiar and very explosive compound, to which he gives the name of triphosphuretted bi-hydride ($P_3\ H_2$). This substance crystallizes in hexagonal prisms. As long as the temperature of the mixture remains constant, there is no fear of explosion, but if after the heat has decreased it be then raised, the triphosphuretted bi-hydride is instantly decomposed into phosphorous and phosphuretted bi-hydride ($P\ H_2$), which takes fire spontaneously. Alcohol is the only compound which prevents these explosions, because it not only arrests the action of the oxygen of the air on the phosphuretted hydrogen and the production of biphosphuretted hydrogen, but also, what is most important, the formation of phosphuretted bi-hydride.

To prepare the hypophosphite of lime, which may be taken as a type of these salts, a sufficient quantity of hydrate of lime is mixed with three times its weight of distilled water to which a third of pure alcohol has been added. The mixture is introduced into a long-necked flask heated gently in a sand-bath. When the mixture has attained a temperature of 50° to 60° Cent., small pieces of phosphorous are gradually added, until the action has entirely ceased. The apparatus is allowed to cool, and the solution filtered through asbestos. The filtered liquid is freed from alcohol by distillation in a retort, the residual solution evaporated to perfect dryness, and the white powder thus obtained preserved in well-stoppered glass bottles.

The hypophosphite may be crystallized in the retort by a slow evaporation.

The action of the alcohol is thus explained: the phosphorous acting on the hydrate of lime by heat gives hypophosphite of lime and phosphuretted hydrogen.

$$4\ P + 3\ Ca\ O + 3\ HO = 3\ (PO, Ca\ O) + PH_3.$$

Two intermediate compounds are also formed: biphosphuretted hydrogen and triphosphuretted bi-hydride.

$$8\ P + 3\ Ca\ O + 3\ HO = 3\ (PO, Ca\ O) + P_2\ H + P_3\ H_2.$$

The alcohol decomposes these two compounds, forming phosphide of ethyl.*

This again is decomposed by the base into hypophosphite and alcohol, a part, however, remaining mixed with the alcohol recovered by distillation; this may serve for a subsequent preparation.

The action terminates by a feeble evolution of hydrogen, from the decomposition of the phosphuretted hydrogen; one part becoming combined during the operation with the oxygen of the air, forming water.

$$PH_3 + 2\,P_2H + 2\,P_3H_2 + 9\,C_4H_6O_2 = 9\,C_4H_5P + 2\,P + 18\,HO$$

$$4\,P + 3\,CaO + 3\,HO = 3\,(PO, CaO) + PH_3.$$

$$\begin{cases} PH_3 + C_4H_6O_2 = 2\,HO + C_4H_5P + 2\,H. \\ PH_3 + C_4H_6O_2 + 2\,O = 4\,HO + C_4H_5P. \end{cases}$$

2. *Properties.*

Hypophosphite of lime is a white powder, inodorous, but of an acrid and burning taste. Deliquescent and very soluble in water, scarcely soluble in ether and absolute alcohol. Soluble in fixed and volatile oils, it is precipitated when they become rancid. It crystallizes with difficulty; the crystals contain two equivalents of water (PO, CaO, 2 HO). Its solution, exposed to the air, is transformed into carbonate and biphosphate of lime. Oxygen converts it first into phosphite and then into phosphate. It immediately decolorizes a solution of sesquisulphate of manganese (Mn_2O_3, 3 SO_3).

Sulphur, selenium, and tellurium, also decompose it into phosphite, then into phosphate, with formation of sulphide, selenide, or telluride of calcium.

Boron, silicon, and carbon decompose it by heat, borate, silicate, or carbonate of lime is formed, and phosphorous evolved in vapour.

Hydrogen decomposes it into phosphate and phosphuretted hydrogen.

Hydrochloric, hydriodic, hydrobromic, and hydrofluoric acids decompose it into phosphate, phosphuretted hydrogen, and a haloid salt.

Nitric acid converts it into phosphate, hyponitric acid being evolved.

The alkaline bases decompose it into phosphate and phosphide.

The alkaline carbonates when boiling, and the alkaline sulphates in the cold, transform it into an alkaline hypophosphite, and carbonate or sulphate of lime.

It precipitates metallic gold from its solutions.

In a solution of nitrate of silver it produces a white precipitate, which rapidly turns brown; if the hypophosphite be added in excess in the cold, it reduces the silver to the metallic state after some time; by the aid of heat the reduction is more rapid.

In a dilute solution of bi-chloride of mercury it produces a crystalline precipitate of chloride. If added in excess, it reduces the mercury to the metallic state.

From a solution of sulphate of copper it precipitates the oxide, which a continued ebullition reduces to the metallic state.

3. *Adulterations.*

Hypophosphite of lime may contain phosphite, phosphate, or carbonate of lime.

These three adulterations are separated by cold distilled water, in which they are insoluble.

The first gives off hyponitric acid, when acted on by concentrated nitric acid; the second, calcined with a soluble salt of lead, gives globubles which crystallize in regular polyhedrons; and the third gives off carbonic acid when treated with a strong acid.

It may also be adulterated with chloride of sodium, sulphate of lime, carbonate of magnesia, and oxide of zinc; these can be recognized by their usual tests.—*Répertoire de Chimie.*

* The phosphide of ethyl thus obtained when separated from the alcohol, is a limpid fluid of a phosphuretted odour and burning taste. It is very volatile, burning at 9° Cent. It is soluble in alcohol; the solution has an opaline appearance. In water it separates in drops like chloroform, which it also resembles in its anesthetic properties. It burns with an emerald green flame, exhaling an intensely disagreeable odour. A little powdered tin, bismuth, or antimony, placed in the flame, causes the colour to pass to pale violet, and finally to pure white. The great danger which attends the preparation and manipulation of this substance, has not yet permitted the author to study all its properties.

PRESERVATION OF RED PRECIPITATE OINTMENT.

BY M. KEFFER.

The difficulty of keeping this ointment good, for any length of time, when made with lard, is a great disadvantage in this preparation.

M. Keffer states that if it be made with castor oil mixed with an eighth of its weight of wax, it will remain unaltered. M. A. Vée, in confirming this statement, observes that he has kept a specimen thus prepared for two months without change; but he considers the proportion of wax indicated by M. Keffer insufficient.—*Répertoire de Chimie.*

PREPARATION OF CASTORIN.

BY M. VALENCIENNES, JUN.

M. Valenciennes was unable to obtain crystals of castorin, white and pure, by simple treatment with alcohol, even when operating on two kilogrammes of castor, on account of a white resin and a yellow substance which were deposited with it. He proceeded by mixing five kilogrammes of powdered castor with the same weight of hydrate of lime, and boiling the mixture with water. The mixture was allowed to cool, and the deposit strained off and dried. This was treated with 12 litres of boiling alcohol at 38° Cart. (sp. gr. .823), the tincture poured off when cold, and the residue again treated with a fresh portion of the menstruum. The tinctures were then mixed and evaporated to a quarter of their volume. The castorin first crystallized out on cooling, slightly coloured, but free from resin, in the form of little white silky needles. The mother-liquors furnished another crop of these crystals; treatment with alcohol and animal charcoal sufficed to effect their complete purification. The five kilogrammes of castor furnished 54 grammes of the pure product.

Castorin is tasteless, its odour recals that of castor. Heated with hydrate of potash it does not evolve ammonia. Boiling acetic acid and dilute sulphuric acid dissolve it, and deposit it in brilliant scales. Potash ley dissolves it only when concentrated and boiling. M. Valenciennes considers it without action on the system, and believes that the properties attributed to castor are due to its volatile oil.—*Répertoire de Chimie.*

ON SOME VARIETIES OF TANNIN.

BY JOHN STENHOUSE, LL.D., F.R.S., F.C.S.

In two communications "On some Astringent Substances as sources of Pyrogallic Acid," read before the London Chemical Society in the years 1842, 1843, I showed that the usual division of the varieties of tannin into two genera—to wit, those which give black, and those which give green precipitates with salts of iron—though called in question by Berzelius, is still well founded: and likewise, that these two genera consist of a great variety of species, which, though closely resembling each other in properties, are still dissimilar in nature; the only instances in which the same species of tannin had been procured from two different plants, being those of nut-galls and sumach. Professor Strecker's important observation made some seven years ago, that grape-sugar is produced when the tannin of nut-galls is boiled with dilute sulphuric acid, seemed to render a further examination of the varieties of tannin desirable.

Sumach.

As the tannin of sumach cannot be obtained in such a high state of purity as that of nut-galls by Pelouze's ether process, I was obliged to employ other methods by no means so satisfactory, but which still yield a tolerably pure tannin. A strong decoction of sumach was therefore treated with acetate of lead, which threw down a pale yellow precipitate. This was washed by decantation, and then decomposed by sulphuretted hydrogen and filtered; the filtrate having been boiled with dilute sulphuric acid, on standing for some time, deposited crystals of impure gallic acid. These were collected on a filter, and the mother-liquor, when neutralized with chalk, gave abundant indications of sugar, both by Trommer's test and when subjected to fermentation. A second decoction of sumach, when cold, was treated with sulphuric

acid, which threw down a copious precipitate; this, when boiled, was also resolved into gallic acid and grape-sugar. This reaction, therefore, in addition to former experiments, serves to confirm the identity of tannin in oak-galls and sumach.

When sumach is long kept, the tannin it contains appears to be resolved, in a great measure, into gallic acid and grape-sugar, owing to its undergoing a species of natural fermentation. Accordingly, under these circumstances, when simply boiled with water, sumach emits an odour resembling that of tea, and yields a large quantity of sugar and gallic acid, but mixed with much impurity. Sumach, therefore, though it contains much gallic acid, owing to the impurities present in it, is not a good source of that acid.

I may also remark, that the amount of tannin in sumach varies considerably, some specimens being very rich and others very poor. This probably arises from the circumstance that the sumach of commerce is the product of various kinds of *Rhus*, such as *Rhus cotinus*, *Rhus coriaria*, &c.

Chinese Galls.

These singularly-shaped galls, which are angular and slightly translucent, have been imported into this country in small quantities for the last fourteen or fifteen years. They are said to be found on the branches of a plant which grows in Japan. From the small amount of the colouring matter they contain, Chinese galls are greatly preferred for the manufacture of gallic acid. Oak-galls, on the other hand, are the best source of pyrogallic acid. The decoction of Chinese galls gave a copious white precipitate with acetate of lead. This was decomposed by sulphuretted hydrogen, and filtered; the clear liquid, when boiled with sulphuric acid, was resolved into gallic acid and grape-sugar, as in the two preceding instances. Another portion of the filtered liquid was evaporated to dryness, and destructively distilled. It yielded a very large quantity of pyrogallic acid. It is clear, therefore, that gall-nuts, Chinese galls, and the various kinds of sumach, contain the same species of tannin.

The Tannin in Tea.

The tannin both of green and black tea is invariably accompanied by a small quantity of gallic acid, which does not arise from the decomposition of the tannin in the tea, as is the case with nut-galls, sumach, or Chinese galls. On treating a strong decoction of tea, when cold, with nearly half its bulk of sulphuric acid, the tannin falls as a dark brown precipitate. This was collected on a cloth filter, strongly compressed, and washed with a little cold water to free it as much as possible from adhering impurities. The precipitated tannin, when boiled with dilute sulphuric acid, did not yield a trace either of grape-sugar or gallic acid, but was changed into a dark brown substance nearly insoluble in water. It dissolved pretty readily in alcohol, forming a dark brown solution, from which, however, no crystals could be obtained.

Oak-bark from Quercus pedunculata.

A decoction of oak-bark gave a dark brown precipitate with acetate of lead. This was decomposed by sulphuretted hydrogen. The filtered solution, when boiled with sulphuric acid, yielded grape-sugar and a reddish-brown precipitate, but no gallic acid. The reddish-brown precipitate dissolved with difficulty in spirit of wine, but gave no crystals on standing. Rochleder has stated that tea and oak-bark contain the same species of tannin. They certainly resemble each other in their general characters; but as the tannin of oak-bark yields sugar when boiled with dilute sulphuric acid, while that of tea does not yield a trace of sugar, it is clear that the two tannins are not identical.

Valonia, the acorn of the Quercus Ægilops.

This species of tannin, which has a bright yellow colour, when treated in the way already described, yielded sugar, but no gallic acid.

The tannin of pomegranate rind also gave abundant indications of sugar, but no gallic acid.

The tannin of Myrobalans, the fruit of *Terminalia Chebula*, gave similar results.

Tannins which give green precipitates with persalts of Iron.

Salix triandra and *Salix undulata* (the willows generally used for basket making).—A quantity of the bark of these two willows, when boiled with water, yielded a dark brown solution. This, when treated with acetate of lead, gave a copious pre-

cipitate of a brownish-yellow colour. This lead-salt was decomposed by sulphuretted hydrogen; and the clear filtered liquid, when boiled with sulphuric acid and then neutralized with chalk, gave abundant indications of grape-sugar. Another portion of the solution from the decomposed lead-precipitate, when digested with nitric acid, yielded only oxalic acid.

When a decoction of willow-bark is boiled with dilute sulphuric acid, the brown-coloured liquid becomes very red, and a flocculent brownish-red precipitate falls, which is nearly insoluble in water, but dissolves pretty readily in hot spirit of wine and alkaline leys. The brownish-red precipitate, when dissolved in spirit of wine and left to spontaneous evaporation, did not crystallize, but formed a dark brownish resin. It consisted chiefly of impure saliratine, resulting most probably from the decomposition of salicine in solution. When it was digested with nitric acid, it yielded a good deal of nitropicric acid. Willow-bark, therefore, is a tolerably good source of this acid.

Alder-bark (Alnus glutinosa).—Alder-bark yields a dark red decoction with water. It was precipitated with acetate of lead, and the lead-salt decomposed with sulphuretted hydrogen. It formed a dark red solution, which on digestion with sulphuric acid yielded no sugar.

Catechu.—It was the light-coloured cubical variety of catechu that I employed. The tannin from this astringent substance, when digested with dilute sulphuric acid, yielded no sugar, a result which corresponds with Neubauer's experiments (*Ann. der Chem. und Pharm.*, vol. xcv., p. 103).

Larch-bark (Pinus larix, *Linn.*).—The bark of the larch is employed in Scotland to some extent in tanning, though the leather made with it is inferior in quality. Larch-bark contains a good deal of a peculiar tannin, which yields olive-green precipitates with salts of iron. The aqueous solution of larch-bark is strongly acid to test-paper, and has at first a pale yellow colour, which exposure to the air renders brownish-red. Acetate of lead threw down a copious yellow precipitate; this was decomposed by sulphuretted hydrogen and boiled with dilute sulphuric acid, when the liquid assumed a fine scarlet colour, like infusion of Brazil-wood. The altered tannin precipitated on cooling in beautiful red flocks, as it is but little soluble in cold water. It is very soluble in alcohol, and its solution has a rich scarlet colour, which is characteristic of this species of tannin. Its alcoholic solution, when left to spontaneous evaporation, did not yield crystals, but formed a dark resinous mass. The clear liquid from which the red flocks were precipitated, when neutralized with chalk, gave no indications of sugar. Sugar, however, together with a good deal of mucilage and resinous matter, with some larixinic acid, is contained in the crude decoction of larch-bark.

Bark of the common black Mangrove (Rhizophora Mangle *of botanists*).—This species of mangrove-bark is used in tanning, and is occasionally imported into Great Britain for this purpose. It has a brownish-red colour: the colour of its decoction is the same. The tannin it contains is precipitated from its solution both by acetate of lead and concentrated sulphuric acid. When boiled with dilute sulphuric acid no sugar is produced, and the brownish-red precipitate which falls cannot be made to crystallize.

In conclusion, I would observe that it is somewhat remarkable that so many of the tannins which give bluish-black precipitates with persalts of iron are glucosides; whereas of those which give olive-green precipitates with persalts of iron, so far as I know, only one—to wit, the tannin of the willow—is a glucoside.—*Proceedings of the Royal Society.*

ON PODOPHYLLIN.

BY HARRY NAPIER DRAPER, F.C.S.L.

PODOPHYLLIN is the somewhat unscientific name which has been given to the resinous matter extracted from the rhizome of *Podophyllum peltatum* (May *apple* or *mandrake*), a ranunculaceous plant indigenous in the United States of America. The therapeutic action of the rhizome itself is that of a cathartic. In its mode of operation it is said to resemble jalap, but to be more drastic. In smaller doses it has been used to diminish the frequency of the pulse and to relieve cough. Thus it has

been used in America in hæmoptysis and other pulmonary affections. The dose as a cathartic is of the powdered root about 20 grains. This root is met with in commerce in pieces of about one-sixth of an inch thick, with swelling, broad-flattened joints at short intervals. It is nearly inodorous, but the powder has a sweetish not disagreeable smell. The taste is a compound of the sweet, bitter, acrid, and nauseous.

According to the experiments of Mr. John R. Lewis, of Philadelphia, the active principle of podophyllum is a resinous substance, to which he has given the name of *podophyllin.* Mr. Lewis believes that in this substance he has succeeded in isolating the cathartic principle and separating it from the other inert resins. The makers of the podophyllin of commerce—which is the substance employed under that name in medicine—put forward, however, no such claim. They simply state it to be a mixture of all the resinous constituents of the root, and if it be found that in this new candidate for pharmaceutical favour we have an efficient and useful cathartic, podophyllin appears to be the best form in which it can be administered. It is made by the following process:—The coarsely powdered rhizome is exhausted with alcohol by displacement, and the spirit distilled off until the residual fluid becomes as thick as treacle. This residue, first gently heated, is slowly poured into water, kept in a state of constant agitation, and the mixture is allowed to stand for twenty-four hours. By this time the resinous matter will have been precipitated as a yellowish-white mass, which is next transferred to a calico filter, washed with water repeatedly, and dried on paper at a very low temperature. According to Parrish, the root yields by this mode of treatment about $3\frac{3}{4}$ per cent. of podophyllin.

Podophyllin is insoluble in water, but soluble to a certain extent in alcohol. The dose is as a cathartic from two to four grains. As it is said to produce nausea and griping, we do not think it will be much used in this country. Hitherto its use has been confined to America, where it is a favourite remedy among that class of practitioners who rejoice in the name of "eclectics."

Podophyllin may be given in the form of pills, either with or without the addition of extract of hyoscyamus, or as a powder, made by triturating it with four times its weight of sugar of milk—a proceeding which is said to very much increase its activity, and therefore to necessitate the employment of a smaller dose. Now, while this latter statement savours somewhat of the doctrine of Hahnemann, it is not altogether absurd, for it is very probable that the power of any medicine may be augmented by so heating it as to expose a larger surface for absorption.—*Dublin Medical Press.*

GINSENG.

Ginseng comes chiefly from Corea and Tartary: that from the former place being the more valuable. It is the dried root of the *Panax quinquefolia,** which grows wild in the districts where the root is collected. It is a curious fact thati t will not bear cultivation. All the ginseng gathered in the empire is imperial property, and sold to those who have the privilege of dealing in it, at its weight in gold. Large quantities are imported from the United States, but this is not esteemed so highly as the native growth of the root.

The root is generally divided into two or three fingers, connected together at their base; it is semi-transparent, and ought to be entirely free from stringy matter. It is a mucilaginous, carminative tonic, with a bitterness something like that of gentian root, but milder, and has a sweetish bitter taste. This tonic is much esteemed by the Chinese, who consider it a specific in all cases of debility, and, in fact, give it as a restorative in most diseases. Its high price, however, renders it a remedy used only by the wealthy, who frequently have recourse to it when other specifics fail.

Presents of this root are frequently made; and accompanying the medicine is usually sent a small beautifully-finished double kettle, in which the ginseng is prepared as follows:—The inner kettle is made of silver, and between this and the outside vessel, which is a copper jacket, is a small space for holding water. The silver kettle, which fits on a ring near the top of the outer covering, has a cup-likecover

* This is the plant which affords the American Ginseng. The Chinese drug is now referred to *Panax Ginseng* Mey.—Ed. *Ph. J.*

in which rice is placed, with a little water; the ginseng with water in the inner vessel; a cover placed over all, and the apparatus put on the fire. When the rice in the cover is sufficiently cooked, the medicine is ready, and is then eaten by the patient, who drinks the ginseng tea at the same time.

A ginseng merchant of my acquaintance, who had a small office at a goldsmith's shop, near the great east gate of Shanghai, has often exhibited to me his stock of the valuable root. He was a man of literary tastes and ability, and by profession a physician, but gave his whole attention to the sale of this article: his entire stock of which was contained in two strong boxes. When I have called to see him, he would first order tea, and after a little time spent over this in general conversation, would ask if "I wished to see his stock of the root?" On replying in the affirmative, he deliberately fetched his keys, and calling an attendant to shut the door, so that neither strangers from the outer shop, nor damp air, might enter his clean and beautifully-furnished sanctum, which was also thoroughly dry, proceeded slowly to unlock the boxes. Opening the outer box, he removed several paper parcels, which appeared to fill the box, but under them was a second box (or perhaps two small boxes), which, when taken out, showed the bottom of the large box, and all the intervening space, occupied with more paper parcels. These parcels, he said, "contain quick-lime, for the purpose of absorbing any moisture, and keeping the boxes quite dry;" the lime being packed in paper for the sake of cleanliness. The smaller box, which held the ginseng, was lined with thin sheet lead; the ginseng, further enclosed in silk wrappers, was kept in little silken-covered boxes. At last, after opening many receptacles, the actual medicine was displayed, each root sewn with silk to its silken wrapper. Taking up a piece, and requesting his visitor not to breathe upon it, nor handle it, he would dilate upon the many merits of the drug, and the numerous cures it had effected. The cover of the root, according to its value, was silk, either embroidered or plain; cotton cloth, or paper. Some of the root was worth not more than six to twelve dollars an ounce; other portions rose in the price, to the most expensive, which was of the enormous value of 300 and even 400 dollars an ounce. This latter the merchant prized of course very highly, and allowed only a glance at it, as he said "it might be injured by exposure to the air." The inspection finished, each root was carefully returned to its place in the box, and this to its position on the lime; the parcels of the latter were readjusted, the outer box locked; and my friend, with a look of relief, would sit down and continue his conversation.

This man, who had a great repute for exceedingly good ginseng, was well known by the common dealers, who regarded him as an authority in his line of business. When asked as to the amount of his trade, he replied that he sold a good deal of the commoner kinds; and every now and then a little of the higher-priced article to government officers and wealthy persons, who gave it to their wives when pregnant, supposing that it marvellously purified the blood and invigorated the system. Another cup of tea, and thanks for the courtesy, would close the interview.

I occasionally took visitors to this merchant's little office, to see his mode of business, and more especially to see himself, as a good specimen of the rich, and quiet, and respectable Chinese tradesman—not eager for crowding customers, but depending on his reputation for the sale of his goods.—Lockhart's *Medical Missionary in China.*

A FEW GENERAL REMARKS ON THE PROFESSIONAL EDUCATION OF MEDICAL AND PHARMACEUTICAL STUDENTS.

BY PROFESSOR BENTLEY, F.L.S.

We extract the following remarks from the Introductory Address delivered in King's College, London, at the opening of the winter session of the medical department, by Professor Bentley, for, although they were especially addressed to medical students, they apply with equal force to those who are qualifying themselves for Pharmaceutical Chemists. After alluding to the advantages to be derived from a diligent study of the various subjects of the medical curriculum, namely, Anatomy, Physiology, Chemistry, Comparative Anatomy, Materia Medica, Botany, Forensic Medicine, Medicine, Surgery, and Midwifery, Professor Bentley said :—

Such is a brief sketch, gentlemen, of the principal subjects of your curriculum, and now I will conclude with a few general remarks. In the first place, let me urge you to be methodical in your studies, for, as Lord Bacon says, "In studies, whatsoever a man commandeth upon himself, let him set hours for it." Portion out your time, therefore, carefully, in order that none may be lost; and in doing so, do not forget to allow a sufficient period for exercise and general recreation, for much of your future happiness in life will depend upon your preserving a "mens sana in corpore sano." For the latter purpose, I need scarcely add that you must avoid all dissipated habits, and all those contaminating pursuits which weaken the body and debase the mind. Take moderate and regular rest; burn no midnight oil, for if you work steadily and economise your time, you will find no necessity for so doing. Be regular in your attendance in the lecture theatre. It is far too much the custom at the present day to depreciate the value of lectures as a means of instruction. Many students think that the information thus acquired may be more readily obtained by reading, and hence they frequently absent themselves from lectures. There cannot be a greater mistake than this, for there is no way in which the great principles and details of a science can be so readily and so pleasantly acquired as by regularity of attendance in the lecture theatre, and diligent application whilst there present. I do not deny but that much will depend upon the earnestness and capabilities of your teacher, but as a rule, rest assured, that knowledge will be obtained in one-third of the time by attendance upon lectures, as well as more vividly impressed, than by reading. The fact alone of lectures having formed from the earliest ages a great means of imparting knowledge, ought surely, of itself, to show their importance; but to bring the matter more home to you, I would ask a student to read any particular part of a science, and then attend a lecture upon another portion of the same, and afterwards compare the amount and value of the information he will have acquired by the two methods respectively. Of what value, I ask, would be a knowledge of Chemistry, or any branch of Natural History, acquired simply by reading?

There is one cause especially which I believe has tended to depreciate the value of lectures as a means of instruction. It is the common practice which students fall into, of taking very copious notes whilst in attendance upon them. This is a great mistake, for if a student during a lecture have his eye constantly directed upon the paper on which he is simply recording the words of the lecturer, instead of directing his principal attention to the lecturer himself and the illustrations which he is employing, he necessarily loses in a great measure the effect which must be otherwise produced by the words as they flow from the earnest and high-minded teacher; and at the same time he will gain but an imperfect acquaintance with the details and mode in which the experiments have been performed, or of the nature of the specimens exhibited for the elucidation aud demonstration of the subject-matter of the discourse; and hence the advantages he would otherwise derive from attendance upon lectures over those of simple reading, are, in a great measure, lost. My advice to a student, therefore, is, to take notes only of the "heads" of the lecture, or at least, not to allow note-taking to interfere with his attention to the lecturer, and afterwards, whilst the lecturer with his apparatus and specimens are photographed as it were, in his memory, to fill in the details by reading and thinking over what he has heard.

Above all things, gentlemen, be earnest in the pursuit of the various branches of your professional education. "Whatsoever thy hand findeth to do, do it with thy might." "Work while it is day, for the night cometh when no man can work." Rest assured that whatever difficulties you may have to encounter, they will all give way under well directed and continuous labour, just as the morning mists will be dissipated by the noonday sun. In the words of a great master of eloquence, the late Sir Robert Peel:—"If you will determine to be eminent in your profession, and act with unvarying steadiness in pursuit of that determination, you will, if health and strength be given you, attain it. Genius may have been denied you, but you have faculties of mind so capable of improvement, that if you will improve them, they will supply the place of genius, and open a brighter prospect of ultimate success than genius unaided by such helps could secure you. There may be, and probably are, great original differences in the various ores of the intellectual mine, but rely upon it, the successful working of that mine depends in far the greatest degrec in labour, care, and the perfection of the machinery. I say that thus you may command

success; but in saying so, I do not say that success can be commanded without difficulty. No, the difficulty is the condition of success. It is a severe master, set over us by the ordinance of a Parental Guardian, who knows what is good for us better than we know ourselves, as he loves us better than we love ourselves."

In conclusion, let me affectionately admonish you that whilst you are earnestly devoting yourselves to the pursuit of those branches of secular knowledge, which is the business of your lives, not to forget that you have a still higher duty to fulfil—to prepare yourselves for a nobler and better world hereafter; however arduous may be your studies, therefore, however secular pursuits may require your attention, never forget that it is your first duty, your greatest privilege, as it will be also your greatest comfort,—to ask God's blessing on all your undertakings.

BLUNDERS IN PHARMACEUTICAL DIRECTIONS.

The museum of the Pharmaceutical Society of London affords some very extraordinary instances of misinterpretation of the prescriptions of physicians by druggists and their assistants, due in some cases, no doubt, to the careless writing of the Dr., but very often to ignorance or want of thought upon the part of the compounder. One of the most innocently amusing instances of this kind of which we have heard, occurred in this city (Toronto) the other day; it has afforded us, in common with some professional brethren, a hearty laugh,and may not be unworthy of record in your journal. A prescription was written for a lady, and in the directions for taking the medicine it was stated that each dose was to be followed by a draught of "*species ad decoctum liquor.*" This latter puzzled the compounder, but, after profound reflection, he hit upon what he thought an agreeable and satisfactory translation, the carrying out of which might safely be left to the patient's liking. The medicine was accordingly sent, bearing the following directions upon the label: "xxx drops to be taken three times a day, and followed by a *glass of hot punch.*" Unfortunately (or perhaps fortunately for the joke it affords) the patient happened to be a lady of strict temperance habits, and was quite shocked at the idea of sitting down to "a glass of hot punch," three times a day, of which course of dissipation she averred the Dr. had made no mention. A message was accordingly despatched to the Dr. to inquire if a cup of good tea would not answer in the place of the "punch." The physician was nonplused at first, feeling doubtful of the sanity of his patient, but recollecting the character of her mind, contented himself with recommending that the *punch* should be dispensed with until he had seen his patient. Upon calling, his astonishment may be better imagined than described, when he found upon the label of the bottle the directions as given above. After quieting the anxiety of the lady, he forthwith waited upon the druggist, who confessed the difficulty under which he had laboured, and submitted the copy he had made in his books, *the original recipe having been destroyed*, of what he thought the directions should have been. Judge of his amazement and amusement to find the following: "To be followed by a draught of "*spiritus ad decoct. liquor*," or, as he had freely interpreted it, "hot punch." It was claimed on the part of the compounder that he was assisted in his translation and mystification by a son of Æsculapius who betimes loses his head at the shrine of Bacchus, and in this way accounts for the *spirited* translation produced. We would, however, add, *Hæ nugæ in seria ducant mala.—British American Journal.*

SCIENTIFIC NOMENCLATURE.

Had Milton lived in our days, and studied the "ologies," I think it would have been to them, and not to the clannish names of the North, that he would have gone for illustrations in his Sonnet on the book called *Tetrachordon*. Surely, that hard names are the curse of modern science must be admitted alike by the ignorant and the learned.

Science is not for the idler. No man who has the industry and ambition to become a scholar will grudge reasonable pains bestowed on the language and classification of his subject. Much force, however, lies in the word *reasonable*. In many branches of study, but especially in the sciences of observation, the demands made

upon the student exceed, as I think, all reason. Mineralogy, organic chemistry, zoology, and physiology, are all overdone with technical words, while botany (the ladies' science) is the very abyss of hard names. This might be tolerated if the names were final. But no systematic nomenclature, which is to conform to theory, ever can be final; for the theory itself must change with advancing knowledge. It seems to me that this common character of all theories has been much lost sight of by the inventors of names. Hence it is that to make ourselves acquainted with the results obtained by previous observers, we have to master in each science, not one set of names, but many systems. In botany, it would appear, that no one thought he had done useful work unless he had added something to the already overwhelming mass. As an example of what the evil amounts to, I quote a passage from a little book on British Ferns, written by an author not at all disposed to overburden a popular work with unnecessary scholarship:—

"Brittle Bladder Fern.—This fern, generally known among botanists as *Cystopteris fragilis*, has a host of other names. Some of these are *Cyathea fragilis*, *C. cynapifolia*, *C. anthriscifolia*, *C. dentata*; *Cystea fragilis*, *C. angustata*, *C. dentata*; *Polypodium fragile*, *P. cynapifolium*, *P. anthriscifolium*, *P. dentatum*, *P. rhæticum*; *Aspidium fragile*, *A. dentatum*, and *A. rhæticum*."

In chemistry, the researches of previous years have led to the substitution of name for name, and symbol for symbol, one after another, so many deep that one does not know the "right" appellation of wood-naphtha, or how to ask for a liquid which used to be sold as "spirits of salts," and was *sometime* (as the epitaphs say) muriatic acid, hydrochloric acid, chlorhydric acid, and lately, according to a chemical reformer, hydra-chlora. Sulphates are called thionates by the organic chemists, who run up the Greek numerals until they get to *penta*thionate, and I certainly thought that the acme of descriptive nomenclature had been reached in "methylethylamylophenylammonium," until I found a recent author proposing to substitute for it a word three syllables longer, by way of simplification: I forget exactly how he spelt it.

Is systematic nomenclature a necessity of systematic investigation? I think not. But as the consent of authorities seems to be, in practice at least, against me, I can only venture to propound the question for discussion, and to state reasons for my own opinion. The present opportunity is a particularly favourable juncture for this discussion, because most of the sciences of observation show symptoms of a change in fundamental ideas.

The applications of mathematical physics to chemistry—of chemistry to the functions of animal and vegetable life—the use everywhere of improved optical methods, among which I may mention spectral analysis and examination by coloured or polarized light—and, more than all, the increasing tendency to view Nature as one whole, and the increasing power to perceive universality in her laws—are threatening a complete and immediate disruption of all our existing theories.

And what is a theory? Our lexicon tells us it is a way of seeing—a mode of viewing. No mathematician, no accurate reasoner, ever thinks of a theory as being true, even potentially. It is a mode of viewing the truth, changeable with our point of view, and falling short of the truth by just so much as our limited reasoning falls short of the infinite variety and complexity of the universe, which we can no more grasp in its material than in its abstract form. The finite cannot comprehend the infinite.

These observations are trite; but it is just for the want of noting them that we are encumbered with the flood of names. These have been invented, and grouped, and changed, and re-grouped, and systematized, by each new theorist, as if his theory not only embraced the truth, but *were* the truth. Here and there some great man, like Linnæus, saw the real meaning of his doctrine, as a guide to generalization; and of his system, as an index to his facts. But he wrote only for the learned, and those who explained his system popularly inflicted his nomenclature on the student, but failed to render his idea.

As a proof of the bad scientific habit of the botanists, I will instance what they call "the botanical census" of a country. The physical geologists have somewhat unwarily followed—or, perhaps, lazily quoted—them here, as if the enumeration were real rather than artificial. This so-called census does not give the slightest

clue to the chance of finding a plant; it counts species, not individuals; and a nook in a hedge with a dozen different sorts of ferns and mosses counts for more than mile upon mile of brake or moorland. It tells of the system, not of the country. As if to confirm my view, Darwin's hypothesis, which seems now the favourite, looks upon species as transitory distinctions, and therefore makes all enumeration of them unreal.

It is a good thing for an objector to point out a remedy. A good thing, I say, but not a necessary thing. A cook who has spoilt the dinner cannot expect his master to tell him how he should dress it; and an instructor, whose teaching is obviously bad, cannot expect a student to show him his business. Improvements can only be carried out by those who are thoroughly conversant with the details. An outsider can only indicate general principles, and give general advice. I shall content myself with suggesting the following negative rules:—Never invent a name for a thing which already possesses an exclusive one. Never alter an individual name to accord with any theory. Even if a name be not exclusive, do not distinguish, until absolute necessity arise. Look upon individual names as subjects for certainty and fixity; but upon systems as provisional modes of grouping them. Never treat as fact what is merely the consequence of a theory.

I do but ask of the botanists and chemists to follow the example already set them by mathematicians on the one hand, and by men of business on the other. What is an old treatise on botany or chemistry worth now? But the old mathematicians are still profitably read by rising men—indeed, a man can do but little unless he does read them. One has certainly heard of libraries so neatly packed that, like a new plant in a botanical genus, a new book revolutionized the whole arrangement.

The Whigs and the Tories are not guided by the same principles; yet one does not hear that the public offices are remodelled upon every change of administration. Business cannot proceed upon such principles, neither can botany.—C. W. M., *in the Athenæum.*

The following reply to the above, signed C. W. Q., has appeared in the *Athenæum* of November 16:—

"Although agreeing in the main with the remarks of your correspondent 'C. W. M.' on the scientific nomenclature, I must take exception to that part of his letter in which he attacks the chemical philosophers. He sets out with the dictum, 'Science is not for the idler.' He must forgive me if I add a rider to it, 'Chemical nomenclature is not for the superficial.' It is singular that he should find such fault with the only science amongst those which he aptly terms sciences of observation which possesses a perfectly intelligible and logical nomenclature. Chemical nomenclature, as founded by the immortal Lavoisier, is governed by a fixed principle, which ordains that every name shall express the composition of the substance for which it stands. An adept in chemical science knows at once the exact chemical composition of any body from the formation and termination of the name given to it. The word 'methylethylamylophenylammonium,' which appears so unintelligible to 'C. W. M.,' is as easily remembered and understood by a chemist as 'light blue ruled, foolscap paper' would be by an ordinary individual. In this, chemical nomenclature stand in favourable contrast to that adopted by botanists. Such cacophonus epithets as '*Bogglesia Wigginsii*' simply afford the information that the plant so designated was discovered by the illustrious but mythical personages Boggles and Wiggins, without giving the smallest clue to its properties or character; but the term 'Bichloride of rubidethyl,' although just as imaginary, is the name of a substance, of certain composition, which may or may not be discovered some day. As to the synonymes possessed by a very few chemical substances, it is the manufacturers and workmen who are the perpetrators of errors. Mere vendors cannot be posted up in the known composition of their wares. They are asked for spirits of salt, and they sell it. Ask them for hydrochloric acid, and they stare at you. As chemical science advances, names must necessarily change; but if 'C. W. M.' will examine the standard chemical works of the last twenty or thirty years, he will find but few alterations. The principal changes in this way are additions, and not substitutions. When a new element or radical is discovered, a name is given to it descriptive either of its source or of some salient property. For instance, Bunsen has

lately discovered two new metals, cæsium and rubidium, by means of spectral analysis. Their names have been given to them from their forming bluish (*cæsius*) and ruby lines in the spectrum. 'C. W. M.' is mistaken in saying that *organic* chemists call sulphates thionates. Sulphur compounds of the thionic series are *inorganic* substances, and are quite distinct in their composition from sulphates. Chlorhydric acid is simply the French form of hydrochloric acid; the difference in the two words being euphonic, and not theoretical, as in the long-abandoned name —muriatic acid. As to 'hydrachlora,' I fear it is only the invention of an enthusiast with a theory and nomenclature of his own. The proposed substitution for the ammonium compound must, I fancy, come into the same category; but, not having seen the article mentioned by 'C. W. M.' it would be wrong to speak positively. 'C. W. M.' deserves the thanks of all scientific men for having stirred up this subject; and I trust it will be the means of calling forth many more remarks from abler pens than mine.

"In conclusion, I beg to assure 'C. W. M.' that I make these explanations with perfect good humour, and only hope that he will be induced thereby to study chemical nomenclature a little more closely. He will soon see the beauty and intelligibility of such apparently absurd words as 'ethylomethylopropylamine,' and a host of others. "C. W. Q."

A PHARMACEUTICAL DISPENSING PRICE MARK.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—In a communication published in the October number of the Journal, I had occasion to refer to the unsatisfactory state of the dispensing price list. In order to effect a slight improvement, I beg permission to suggest to my fellow Members the desirability of adopting a dispensing price mark, to be understood by Chemists throughout the kingdom. Such a plan, I feel convinced, would be a great boon to many who, under the existing custom, are charging prices much below the usual standard.

The plan proposed is in course of trial at Edinburgh, where the Chemists have arranged a price list both for dispensing and retail; but considering what diversity of prices must ever exist in the various divisions of the metropolis alone, so much more in the provinces, I forbear proposing any attempt at uniformity; but, I believe, a national price mark is possible, and that it would be found of considerable advantage to our corporate interests. I may refer to the widely understood mark of John Bell and Co.; there are few in London ignorant of its bearings, and many in the provinces comprehend it. To my mind it would be another tribute to the memory of the lamented founder of the Society were we to perpetuate "y o u a n d t h e m, z"
1 2 3 4 5 6 7 8 9 10, 0
as the Pharmaceutical mark of the United Kingdom; but whether it, or the Edinburgh one, "M e l B o r a c i s," be chosen, is of no material consequence so long as
1 2 3 4 5 6 7 8 9 10
the principle is accepted. For the advancement of this object, and in the absence of any other arrangement, I shall be happy to receive the names of those gentlemen approving the system who will, when either *convenient* or *desirable*, adopt it.

To prevent confusion, the letters Ph., to signify "Pharmaceutical mark," might
Ph.
be placed over the "stamp" or "name," thus for 2*s*., Godfrey; whilst any material
0/z
deviation from customary charges could be notified by the letters "Ex." (for exceptional) being placed by the side of "Ph."

65, *Bury New Road, Manchester, Nov. 12th*, 1861. Wm. Jabez Halliday.

DRUGGISTS' FESTIVAL AT GLASGOW.

The first annual social meeting of the chemists and druggists of Glasgow was held, on Thursday evening, Oct. 7th, in the Bedford Hotel, George's Place, when fifty gentlemen connected with the profession sat down to a sumptuous and elegant supper, served up in excellent style, by Mr. Charles, the host of the Bedford. Donald Campbell, Esq., occupied the chair, and was supported right and left by Dr. Milner, Mr. De

Bois, John Currie, Esq., Mr. John Campbell, &c. Mr. A. M. Levie acted as croupier. After the usual loyal toasts, the chairman delivered a short and pithy address, in which he congratulated those present on the success which had attended the first annual meeting of the profession, and expressed the hope that their future meetings would be equally successful, and that their present meeting was only the prelude to the social and educational improvement of the young men connected with the drug business. The following toasts were then given with all the honours—viz., "The Medical Profession," by Mr. Morrison—replied to by Dr. A. M. Robertson; "Our Employers," by Mr. Johnstone—replied to by Mr. M'Call; "The Press," by Mr. T. D. Moffatt, who gave a brief sketch of the history of the newspaper press during the last thirty years—replied to by Mr. Frazer, of the *Protestant Layman*, himself an ex-druggist. Then followed "The Ladies," by Mr. John Campbell—replied to by Mr. M'Gregor. During the course of the evening a number of humorous and sentimental songs were sung in capital style by Messrs. F. Moffat, M'Lean, D. Campbell, and M'Call, which were loudly applauded. A hearty vote of thanks was afterwards given to the chairman for the admirable manner in which he had conducted the proceedings; and the meeting broke up shortly after twelve oclock.—*North British Daily Mail.*

MISCELLANEA.

The Action of Chloroform on the Blood.—In the Boston *Medical and Surgical Journal* for March, Dr. C. T. Jackson says—"Chloroform consists of one equivalent of formyle and three of chlorine. When chloroform is inhaled into the lungs, the oxygen is abstracted from the blood, and, combining with the formyle, makes formic acid; while chlorine combines with the blood as a substitute for oxygen. Thus a portion of the blood becomes chemically changed, disorganized, and rendered unfit for its vital functions." He further says—"I have now a phial of this blood (blood taken from a young lady killed by the inhalation of pure chloroform) before me, it having been kept in my office exposed to temperatures from the freezing point to above 80° for more than six years, and yet it has not decomposed, nor has a single blood-globule settled to the bottom of the phial, nor has the colour changed in the least."—*Medical Times and Gazette.*

Triticum Repens, a Remedy in Irritable Conditions of the Bladder.—Mr. Henry Thompson, assistant-surgeon to the University College Hospital, in a communication to the *Lancet*, Oct. 12, states that he has used the above remedy with marked success. Mr. Thompson observes:—The form I have adopted has been uniformly the same. One ounce of the dried and cut stem is infused in a pint of boiling water for an hour. The liquor removed by straining has been given, unmixed with any other remedy, in quantities varying from twelve ounces to a pint during the twenty-four hours, in several doses. The taste of the infusion is rather agreeable than otherwise; it produces no nausea or derangement of the stomach. I believe it is important that the plant should be gathered in the spring, shortly before the leaves appear; the stem is then to be slowly dried without artificial heat, and cut into short lengths for use. The infusion obtained from material so treated is superior to that made from plants gathered indiscriminately at any time, and also to the infusion made from the Triticum repens which is imported by the herbalist for the purposes of French pharmacy in this country.

Physiological and Therapeutical Effect of Drosera.—M. E. Curie, having proved that Drosera when administered to cats for a lengthened period caused the formation of tubercles in their lungs, has tried it as a remedy in phthisis, and believes that he has found in it a cure for that disease, and thus established the truth of the fundamental principle of homœopathy.—*L'Union Pharmaceutique.*

Formation of Fatty Matter in Olives.—The cause of the formation of the different fatty and other principles which exist in plants is at once a most interesting problem to be solved, and one upon which but little light has hitherto been thrown. M. de Luca has endeavoured to solve it with regard to the oily principle of olives, but he has only succeeded in establishing certain relations between the density of this fruit and its richness in oil. Thus he found that in perfectly ripe olives the density had obtained its minimum, and the oil its maximum, a result which it was

easy to foresee. M. de Luca has found *mannite*, not only in the olives themselves, but also in the different organs of the olive plant, and particularly in the leaves. This saccharine matter is easily extracted by the employment of boiling alcohol, which deposits it upon cooling. It appears to be connected with the production of the fatty matter.—*L'Union Pharmaceutique.*

Carbonized Rye as a Tooth Powder.—Rye charcoal is said to be much used in Paris as a tooth powder. The following constituents have been found by Schrader in 500 grammes of the ashes of rye:—Carbonate of lime, 7 grammes; 9.8 ditto of carbonate of magnesia; 7.2 ditto of oxides of iron and manganese, and 1.9 ditto of silica.

Non-Inflammable Fabrics.—A French chemist has just discovered the mode of rendering muslin, lace, and all kinds of light stuffs incombustible. Neither does he make any secret of his discovery. It is merely necessary to mix with the starch used in making them up the half of its weight of carbonate of lime, commonly called Spanish chalk or Spanish white. The muslin or other stuff is then ironed as usual. The chalk thus added in no respect injures either the appearance, the quality, or the whiteness of the stuff.—*Times.*

A Patented Ointment.—We learn from the *Chemical News*, Nov. 9th, that a patent has been taken out for the following ointment for the cure of sores:—Litharge, one lb.; strong vinegar and olive oil, of each about a pint. These materials are first well incorporated, and then boiled till they form a thickish paste. It is recommended to apply the ointment by spreading on a surface of bibulous paper.

Nothing like Leather.—Sir James Murray, of Dublin, in a paper in the *Dublin Medical Press*, for Oct. 23rd, 1861, proposes that a solution of bicarbonate of magnesia (fluid magnesia) should be substituted for alcohol in the preparation of tinctures. We are not informed how these magnesian tinctures will keep, or how they are to be administered with acids and caustic alkalies; but probably a slight decomposition is thought to be of no consequence.

Quackery.—A thorough-faced charlatan has been rifling the pockets and turning the heads of the chronics and cripples of New York. He discards all remedies, and relies entirely on the touch of his inspired finger. He is very devout, and is of course anxious to use his divine power for the good of his fellows. The *American Medical Times* says that his door is besieged by both poor and rich, and although he has been at work several weeks there is no marked diminution in the number of incurables, and still the furor continues unabated, fanned by the daily papers. Such credulity and actual stupidity as are manifested by those who become his dupes, it is humiliating to witness. It is our firm belief that these impostors would not get much to do if they were not sustained by the daily papers. This is the engine which they well know how to work, and they do it to admiration. A few dollars—a puff—and presto! the dollars so expended are returned a hundred-fold into their pockets.

Accidents from the Escape of Carbonic Acid Gas.—The *Birmingham Post* states that Sir F. Goodricke and his family have been placed in imminent peril of their lives. It appears that in order to provide for the increasing severity of the weather, the servants had commenced heating the various apartments of Studley Castle by the hot air flues provided for that purpose, and either from want of proper regulating, or from negligence in removing and not replacing the covers of the apertures, a large quantity of carbonic acid gas was emitted to the several rooms. The first to feel the effects of this gas was a lady visiting at the castle. Finding that she was rapidly becoming insensible, Sir Francis instantly set out for Mr. Morris, surgeon, who came at once, and on his arrival found that Lady Goodricke was also apparently dying. Mr. Morris soon divined the cause, and took his remedies accordingly, but while he was attending to Lady Goodricke and the lady first seized, Sir Francis himself and Miss Goodricke also swooned. Every attention possible was given to the sufferers, but they remained unconscious for hours. Happily they were all ultimately restored, and are now become convalescent.

A similar occurrence, but in this case attended with fatal results, took place at the Cardiff Docks, on Saturday morning, November 9th, on board the schooner Speedy, from Waterford, Captain E. James. It appears that on Friday night five sailors went to sleep in the forecastle of the ship, taking with them a pot of burning

coals, for the purpose of heating their berths. In order, no doubt, to make themselves more comfortable, they shut up the hatchway, and by this means prevented the possibility of fresh air reaching the forecastle. The result was, that on Saturday morning two of them were found dead in their hammocks, having been suffocated during the night. The captain, not finding the men on board, went to the forecastle, and in looking for them was so overcome by the atmosphere that he fell almost insensible on the floor. He managed, however, to get on deck, and after assistance had been procured the whole of the men were got out, three of whom were found to be still alive. An inquest was held on Saturday evening, when the above facts were deposed to, and a verdict of "Died from suffocation" was returned.

Accidental Poisoning.—The sad death of Mrs. Ernest Hart, on Thursday, November 7, has given rise to much comment, and many incorrect rumours have been circulated. The facts we believe to be strictly as follows:—Late on Wednesday night, Mrs. Hart took a drachm of tincture of aconite which had been ordered in a two-ounce mixture for a child, staying in the house, who was suffering from whooping-cough. The mixture was taken in mistake for a black draught. At three in the morning Mr. Hart was disturbed by his wife vomiting, but this was attributed to the black draught, and no fears were excited. It was not until after breakfast on Thursday morning that the mistake was discovered. By that time all cause for alarm seemed to have subsided. Dr. Richardson saw the lady at eleven o'clock in the forenoon, and thought her quite out of danger. It seems that some vomiting had excited Mr. Hart's apprehension, and a question was raised as to the propriety of checking this symptom. Dr. Richardson thought it was not advisable to interfere. He was called in again at one o'clock, and found the lady dead. It then appeared that two or three doses of hydrocyanic acid had been given in order to check the vomiting. The verdict at the inquest was "Accidental death." The medico-legal questions as to the action of aconite and hydrocyanic acid raised by this painful case are of great importance.—*Medical Times and Gazette.*

Poisoning by Laudanum—An inquest was held at Chester, on Wednesday, Oct. 30th, on the body of George Henry Davies, who was a druggist's assistant at Rhyl, in Wales. About two months since he became possessed of a large sum of money, with which it was intended that he should look out for an eligible opening and commence business. He left his situation, and, after roaming about a short time, made his way to Chester. There he led a rather dissolute life, and a short time since he made the acquaintance of Jemima Morgan. On Sunday, Oct. 27th, they took a trip to Liverpool, and in the evening again returned to Chester. During their journey from Birkenhead to Chester, Davies took a bottle containing laudanum out of his pocket, and said to Morgan he was determined to poison himself. She took the bottle from him, and emptied the contents out of the carriage window. They went to several public-houses after they returned to Chester, and then returned to their lodgings in Frodsham Street. During this time Davies frequently talked about poisoning himself. Before returning, Davies wrote a prescription in Latin, for laudanum and sent a boy to a druggist's shop to fetch it. Soon after this they retired to their room, when Davies again said he would take poison. Morgan tried to persuade him not to do so; but, he still being determined to take it, she agreed to die with him. They then arranged that Davies should pour out Morgan's laudanum, and that she should pour out Davies's. After this had been done, Morgan's heart failed her, and she had not sufficient fortitude to take her share for some minutes. Davies, finding she hesitated, said he would take both her portion and his own. This she would not allow him to do, and, filling up her glass with bitter beer, immediately swallowed the contents, Davies following her example. They then retired to rest, but after the lapse of a quarter of an hour Morgan became alarmed from hearing Davies breathing very heavily. She at once called for assistance, and it was deemed advisable to remove them to the Infirmary. Davies, however, was insensible, and, although everything was done to revive him, he died soon after nine o'clock on Monday morning, Oct. 28th. The laudanum was not so effective upon Morgan, for, after taking an emetic and some stimulants, she gradually recovered. The deceased had written several letters, in one of which he expressed an earnest hope that he and the young woman would be buried together. After these facts had been elicited, the coroner having summed up, the jury, after a

few minutes' consultation, found the following verdict:—"We find that deceased died from taking laudanum while in a sound state of mind, administered by his own hand, and that the prisoner was accessory to the act." The prisoner was committed for trial at Chester assizes.

Accidental Poisoning by Laudanum.—Mr. Bent held an investigation at the Mail Coach, Shepherd's Bush, Hammersmith, into the circumstances attending the death of Emily Ada Hick:—It appeared that the mother of the deceased, who resided at No. 11, Providence Place, Shepherd's Bush, observed that the deceased appeared ill, and that her eyes seemed fixed. She at once applied to a neighbouring druggist, who gave the child an emetic. At length the elder sister told her mother that the deceased had picked up a bottle in the adjoining premises, and drank from it; she, however, took it from her, and threw it away. The child ran into the ground and brought in a small phial bearing a label, "Laudanum," and said, "That is the bottle, mother." The mother immediately ran with her suffering child to a surgeon, who attended it until death. The jury returned a verdict of "Death from poison, accidentally and by misfortune."

Poisoning by Cyanide of Potassium.—An inquest has been held at the Red Cow, Chapel Street, Stratford, on Henry Giblett, aged two years and six months. The deceased accompanied some other persons into a photographic van in Bridge Road, Stratford, and as they were having their portraits taken he suddenly became alarmingly ill, and by the time Mr. Kennedy, the surgeon, arrived, had expired from the effects of a quantity of cyanide of potassium, which it is supposed he swallowed out of a phial which was in a cupboard. The jury found an open verdict, "That the child died from the effects of the poison, but how administered there was no evidence to show."

Death from Chloroform.—An inquest has been held at the Black Lion Inn, Mighell Street, Brighton, on the body of William Heath, aged fifty years, who died under the influence of chloroform, administered in contemplation of a surgical operation. It appeared that Heath, who was a man of intemperate habits, had a disease for the cure of which he sought the advice of a medical gentleman in Brighton named Field, who advised an operation, which, being of a painful nature, the administration of chloroform was recommended. To this the patient consented, and a Mr. Nourse, who had been employed in many similar cases, attended to administer it. Scarcely, however, had he begun to apply it, when symptoms appeared that induced these gentlemen to proceed no further; they then directed all their efforts to restore the patient to consciousness, but finding this to be without effect, two other medical men were sent for, but the patient grew cold under their hands, and life became extinct. A *post-mortem* examination was made of the body, and the only morbid appearance found was an enlarged heart, and a fatty degeneration of its substance, and the cause of death would be the chloroform acting upon a heart in such a state aggravated by long continued habits of intemperance. The jury returned a verdict in accordance with the medical testimony.

Poisoning by Arsenic.—On Thursday, November 14, a gang of convicts were employed at the Royal Clarence Victualling-yard, Gosport, carrying coals to the engine-house, when one of them divided a piece of cake he had become mysteriously possessed of, and which was quickly swallowed with infinite gusto by the trio. These pleasurable sensations were, however, soon succeeded by others of an opposite character, and the cake-eaters were seized with violent vomiting and other alarming symptoms, which eventually led to a confession, to the effect that the piece of cake had been purloined from the pocket of Mr. Bushnell, the engineer. That gentleman, on learning the circumstance, found, indeed, that a piece of cake which he had placed in his coat-pocket was gone, but declared that it had been made in a peculiar manner to destroy rats, and that one of its chief ingredients was arsenic. The repentance of the trio was now as complete and sincere as their sufferings, but their critical state necessitated their immediate removal to the infirmary of the convict prison at Portsmouth, were the usual remedies requisite in such cases were administered.

Suicide by Cyanide of Potassium.—On Wednesday, November 13, an inquest was held at 6, Lower Eaton-street, Belgravia, on Samuel George Walton, aged

20, the son of Mr. George Walton, vestryman of the parish, of the above address. The evidence of the deceased's father was, that his son had some time ago formed the acquaintance of some woman, believed to be a widow, of which he and Mrs. Walton knew little or nothing. Subsequently, at various times, he expressed great desire to marry her, and threatened to commit suicide unless his parents sanctioned the marriage, which they refused to do. At last witness, being apprehensive that he would carry out his threats, gave his consent to their marriage, provided he applied himself to business (perfumery) for a year, to expire next Michaelmas, but that did not satisfy him, the time being too long to wait. On Monday, Nov. 11, he was out with the lady all day, and returned about five in the evening. He then again urged his father to allow him to marry her immediately, and give them 100*l.* a year. Witness declined. Shortly afterwards deceased went away to his bedroom. Soon after his mother found his door secured, and gave an alarm. Witness had the door forced, and found the young man lying dead on the bed, with a bottle containing cyanide of potassium, and a letter near him to the effect that his father had caused his death by cruelty. Mr. Walton thought his son was insane, and that this woman had caused him to commit this act. Other witnesses related incidents to prove his insanity, and his parents' extreme and constant care and indulgence of him, even to a fault. The jury returned a verdict of suicide by cyanide of potassium while in a state of unsound mind.

Attempted Poisoning in Ceylon.—On the evening of Friday, October 11, Mr. Shand entertained a large party, including General and Mrs. O'Brien. After coffee had been served they all became more or less sick, some violently so. The General suffered very severely, and we understand that Mr. Pennefather continued to feel the evil effects of the dose, more or less, for several days. No suspicion attaches to the cook, who, having partaken largely of the coffee, after a day of fasting and fatigue, himself suffered frightfully. A considerable number of native servants belonging to the house and in attendance on the guests also partook of the coffee, and suffered in consequence. The symptoms and the indications, as far as tests have been applied, all point to arsenic as the poisonous agent employed. We regret to say that the old question, "Who is she?" applies in this case. A lad in Mr. Shand's service carried on a *liaison* with the ayah, a married woman. The cook denounced the guilty parties to the husband, and it is supposed that, to be revenged on the cook, the lad referred to mixed the poison with the coffee, nearly sacrificing the lives of twenty or thirty persons who partook of it. This is the suspicion at present, and the supposed guilty party is in custody. Mr. Shand is about to issue notices in the native languages offering a reward of 50*l.* for evidence which shall lead to conviction.—*Colombo Observer*, Oct. 18.

Death from Chloroform.—On Saturday, November 9, Mr. G. S. Brent, deputy coroner for West Middlesex, held an inquest at the Bank of England Tavern, Cambridge-place, Paddington, on the body of Edwin Hambly, aged eight years, a native of St. Mabyn, Cornwall, whose death occurred while under the influence of chloroform on Wednesday, the 6th instant. Mr. Edwards, chloroformist to St. Mary's Hospital, deposed that he had held that position for the last eight years. The deceased was admitted to the institution on the 25th ultimo to undergo a plastic operation to remove a great deformity, occasioned by a burn in the chin, which had the effect of drawing it down to an unusual degree, and turning the lip inside out. On the day appointed for the operation, witness administered the chloroform gently. It took ten minutes to get the boy under its influence, and then the operation was commenced by Mr. Lane, the senior surgeon. Just before the conclusion the deceased fainted, and, with a view to restore him, witness promptly commenced artificial respiration, which he kept up for half an hour. Failing in his efforts, he was put in a warm bath, and galvanism was applied for an hour and a half, but without success. Witness believed that the poor boy died instantly he fainted, from paralysis of the heart. This was the first and only fatal chloroform case he ever had since the opening of St. Mary's Hospital, now over ten years, during which time chloroform had been successfully administered to upwards of 4000 persons. In a *post-mortem* examination they found all the organs healthy, and no trace of disease anywhere. Death was solely from paralysis of the heart from the effects of chloroform. In

reply to the deputy coroner and jury, witness said he considered chloroform invaluable, and had applied it with the utmost success, even in cases of operations where the heart had been very much diseased, and where there was hardly a lung sound enough for the patient to breathe through. He never had a case die before from chloroform. The strangest part of this affair was that, when death took place, the boy was apparently recovering from the effects of the chloroform. Other medical gentlemen who were examined fully corroborated the evidence of Mr. Edwards, and testified to his great experience, and his remarkable caution in the administration of chloroform. The jury returned a verdict that the deceased instantly died during the performance of a surgical operation upon him from the effects of a failure of the action of his heart, occasioned by chloroform accidentally and by misfortune.

TO CORRESPONDENTS.

Mr. James Browne, of Coventry, the successful competitor of the present year for the Silver Medal offered annually by the Council for the best collection of British Plants, has written a letter to the Editors, in which he expresses his surprise at the small number of competitors for the herbarium prizes. He thinks that it is accounted for by the great expense necessarily entailed upon the candidates in collecting and preserving their plants for competition, and suggests, as a remedy, that a small money value should be added to the medals.

A Registered Apprentice (Pendleton).—(1.) Bentley's *Manual of Botany*, with the other books you mention, will be all you require for the purpose. (2.) We think not, but the matter is not yet decided. (3.) For the study of British Plants either of the two Floras alluded to will be sufficient.

Mr. R. C. Furley (Edinburgh).—Your communication was received too late for insertion; you will find, however, a short account of your process in the present Journal.

W. P.—Bentley's *Manual of Botany*, or any other modern work on the subject.

J. A. (Peterborough).—The wording of the label sent for inspection would not render the article liable to the patent medicine duty.

S. L. P.—Impressions of Leaves. Vol. viii., page 585.

W. B. (Newbury).—Cooley's *Practical Receipts* would afford the information required.

The Patent Medicine Licence.—We have received a communication from Mr. H. W. Stuart, of Woolwich, complaining of the injustice to Druggists living in London and its neighbourhood, in having to pay £2 per annum for the privilege of selling patent medicines.—[This subject has not been lost sight of; Mr. Stuart's letter will be kept for reference on a future occasion.]

A. Z. (Birkenhead).—(1.) *Red Ink*, vol. xii., pp. 71 and 601. (2.) Tincture of Arnica of the Prussian Pharmacopœia is made with the flowers, in the proportion of ℥iss to 1 lb. of spirit of wine. See vol. xiii., page 588.

H. C. (Bedford).—Dana's Manual of Mineralogy, 7s. 6d.

Juvenis.—(1.) See any work on chemistry. (2.) Introduce into a measured quantity of air $\frac{1}{40}$ or $\frac{1}{30}$ its volume of solution of potash of sp. gr. 1.4. Shake them together and observe the volume of air left; then introduce a small quantity (half as much as the solution of potash) of a solution of pyrogallic acid in water (one of acid to five or six of water). Shake them together, allow them to stand a few minutes, and read off the volume of gas left. The first loss will be carbonic acid, the second oxygen. (3.) We have not observed the result referred to.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editors, 17, Blooms bury Square.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. III.—No. VII.—JANUARY 1st, 1862.

THE INTERNATIONAL EXHIBITION OF 1862.

The national sorrow which still rests upon all classes of Her Majesty's subjects affords evidence of the extent to which the moral and intellectual attainments and valuable services of the late lamented Prince Consort were appreciated by the people of this country. As the patron of Science and the Arts, the promoter of every good work tending to advance the social improvement of the community, and especially as the originator and one of the most distinguished supporters of our International Exhibitions, past and prospective, Prince Albert exerted so important an influence that his sudden and premature death cannot fail to cast a gloom over the proceedings connected with the great building and its contents, which are intended to exhibit, a few months hence, the works of art and industry of all nations. The loss we have thus sustained must not, however, be allowed to damp the energies of those who were making preparations for this Exhibition; on the contrary, we are called upon, more than ever, to mark our sense of gratitude for what the Prince has already done, by carrying this, his last great undertaking, to a successful issue.

The Pharmaceutical Society has pledged itself to contribute a collection of Medicines, illustrating the existing state of Pharmacy in this country; and it is hoped that all the members capable of doing so will endeavour to aid in carrying out this object. We know that many of our members are already preparing to do so, and we hope that others who are proposing to co-operate will not allow the time to pass on too far before they actively commence work. Sufficient space has been granted by the Commissioners for an extensive collection; and the contributors to this collection will find the trouble and expense attending this united exhibition much less than they would be in exhibiting separately.

THE PROPOSED AMENDED BYE-LAWS OF THE PHARMACEUTICAL SOCIETY.

In the number of this Journal for last May, we noticed the fact that the financial position of the Pharmaceutical Society was occupying the serious attention of the Council, and that some propositions would probably be submitted to the Members for placing the sources of income of the Society upon a more permanently satisfactory basis. It was pointed out on that occasion that while the Members and Associates of the Society were comprised under no less than eight distinct classes, according to the time and conditions of their admission, it was from three only of these classes that the Society principally derived its pecuniary support. These three classes consist of Members, Associates, and Registered Apprentices, paying annual subscriptions, who were admitted as such before 1853. All who have been admitted since that time have paid small fees on admission, which are disproportionate to the annual subscriptions, and inadequate to the proper support of the Society. It was foreseen that as the annual subscribers died off, the income of the Society would decrease, and that it would thus soon fall below the most limited expenditure capable of supporting the institution in an efficient state. The Council have been desirous of averting this prospective difficulty, and having explained the circumstances of the case to the Members, an invitation was given and freely responded to for a full expression of opinion in the pages of this Journal.

In the discussion of this subject, the point principally adverted to, and that alone on which any difference of opinion has appeared to exist, had reference to the admission to membership, without the usual examinations, of those who were established in business on their own account prior to 1853. Strong objections have been urged against relaxing the terms of admission in favour even of old-established chemists who failed to take advantage of the opportunities presented to them at and before the passing of the Pharmacy Act, and the question relating to this point may be now considered to be definitively settled in favour of examination as a necessary condition to membership in all cases.

Having thus disposed of the most difficult point in connection with the subject, the Council have proceeded to consider what changes in other respects were required, in order to ensure as far as possible a permanent and adequate income for the Society. This has not been forced upon them by any immediate want, but suggested as an act of prudential forethought, in favour of which, also, a consideration of the disparity in the contributions of the different classes of Members under the existing Bye-laws, cannot fail to have operated. Hitherto the Society, since the passing of the Pharmacy Act, has been too liberal in the terms on which it has admitted Pharmaceutical Chemists, Assistants, and Apprentices, to a participation in all the benefits of a well established, important and influential Association. According to the existing Bye-laws, a Pharmaceutical Chemist who has passed the examinations, on the payment of a fee of five guineas, is admitted a Member of the Society for life. Without any further payment, he can enjoy all the advantages of the Society, having a well appointed establishment, with extensive museums, and library, with lectures and meetings, and a Journal which is supplied to the Members monthly free of cost. It is quite obvious that the Journal alone is more than equivalent to the fee paid for membership. What, then, do these Members contribute towards the support of the Society? In the case of a young man who passing the examination becomes a Member at two or three and twenty years of age, the Society may have to supply him with the Journals for thirty or forty years or more, in addition to all the other privileges

of membership. In the case of Associates, and also Registered Apprentices, the Society receives no contribution in return for the great and manifest advantages afforded by the institution. They pay their registration fees on examination as required by law, and Associates receive the certificate of qualification, which is available as professional capital. They have thus far done no more than the Pharmaceutical Chemist does on passing the major examination, when he becomes registered as a qualified Pharmaceutist, and receives the certificate as such. The latter however pays a fee of five guineas to become a life member of the Society, while the former (Registered Assistants and Apprentices) pay nothing for the privilege of connection with the Society, from which they receive the Journal, and many other advantages provided especially for their benefit.

It may, perhaps, be stated by some of the parties to whom we refer that they are indifferent to the advantages presented by the Society,—that the splendid establishment in Bloomsbury Square is of no benefit to them, that they do not use the museum or library, and never attend the meetings; and then, as for the Society's Journal, it comes to them punctually by post on the first of every month, and occupies a good deal of room on their bookshelves, but they seldom read it, and think it might be much better suited to their wants or *tastes* than it is. Why should they be called upon to pay for all this? It may be asked in return, Why do these objectors belong to the Society at all? If it is not for the direct advantages afforded, it is probably because they wish to be associated with those of their professional brethren who, as a body, stand high in public estimation; or it may be they fancy that an influential Society will afford to its members some security against external aggressions, to which, before the formation of such Society, they or their predecessors were not unfrequently subjected. In either case the effect is produced, not by a mere name, but by the work that has given to that name a material value. Without the establishment in Bloomsbury Square, with its museum and library, its lecture-room and laboratories, and, above all, the good work which these and a widely circulated Journal have effected, the Pharmaceutical Society would be useless and powerless for any direct or indirect influence or effect. The Society cannot be kept up without funds, and the Members, Associates, and Apprentices, all of whom participate in one way or another in the benefits resulting from the Association, should contribute to its support according to an equitable scale. This is the conclusion to which the Council have arrived, and in accordance with which the proposed amended Bye-laws have been framed. The whole subject has received a most thorough and careful scrutiny, and, after repeated deliberations, the Council have resolved to submit the result of their labours to the decision of a General Meeting of the Members, which is convened for the 15th day of this month (January). To enable the Members to judge of the expediency of these amendments, the proposed Bye-laws are given side by side with the existing Bye-laws in the present number of this Journal.

The most important alterations will be found in the first section, and the effect of these alterations will be that those who in future are elected Members, Associates, or Apprentices of the Society, will be required to pay annual subscriptions in lieu of fees. The subscription from Members is proposed to be a guinea, and that from Associates and Apprentices half-a-guinea; thus equalizing the contributions of those who shall in future join the Society with that of the original founders and supporters of the Institution. The other alterations are chiefly verbal, and are intended to render the meaning more obvious, or to remedy some inconveniences which may have been experienced in the working of the existing regulations.

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *4th December*, 1861,

Present—Messrs. Bird, Bottle, Brady, Davenport, Edwards, Hanbury, Haselden, Meggeson, Morson, Sandford, Savage, Squire, and Waugh, the following were elected

MEMBERS.

CAMBRIDGE	Church, Henry J.
EALING	Barry, Thomas
GOOLE	Hasselby, Thomas John
LONDON	Gilbert, George Fagge
MUCH WENLOCK	Edwards, William
SUNDERLAND	Nicholson, John Joseph
WORCESTER	Walton, Henry

SPECIAL MEETINGS OF THE COUNCIL.—*11th December.*

Present—Messrs. Bucklee, Davenport, Hanbury, Hasselden, Herring, Hills, Lescher, Morson, Sandford, and Waugh.

18th December.

Present—Messrs. Bird, Bucklee, Davenport, Hanbury, Haselden, Hills, Lescher, Morson, and Sandford.

It was Resolved—

"That a Special General Meeting of the Members of the Society be held on Wednesday, the 15th day of January, 1862, at one o'clock P.M., for the purpose of approving the proposed alterations in the Bye-Laws."

MAJOR EXAMINATION, *18th December.*

Fisher, Francis Dixon	Grantham
James, John	Swaffham
Morgan, David	Aberayron
Pratt, Henry	Stratford-on-Avon
Sturton, John Rowland	Peterborough

MINOR EXAMINATION.

Argles, Robert	Clapham
Capern, Alfred	Bedford
Hopgood, Richard Cooper	Chipping Norton
Hoskin, Montague John	Southampton
Knights, John Atmore	Norwich
Marrack, Philip	Crediton
Martin, James	Southampton
Slator, Thomas	Boston
Tolbort, Thomas William Henry	Dorchester
Walkinton, Thomas James	Tenby
Willsher, Stephen Henry	Tenterden
Whitfield, John	York

REGISTERED APPRENTICES.

NAME.	RESIDING WITH.	ADDRESS.
Barnett, Elijah William	Mr. Wood	Worcester
Bell, Richard Edward	Mr. Noakes	Brighton
Bolton, Frederick William	Mr. Claremont	1, Thorney Place, Oakley Sq.
Cooke, Francis	Mr. Kershaw	Southport
Fosbrooke, Fred. James Rich.	Mr. Hickley	125, Edgeware Road
Gray, William	Mr. Banks	Birmingham
Keen, John	Mr. Stocker	112, Drummond Street
Kerfoot, Thomas	Mr. Nadin	Hyde, Cheshire
Newcomb, Henry Alexander	Mr. Baker	Lewisham
Tarner, Alfred Phythian	Mr. Blades	52, Edgeware Road

THE JACOB BELL MEMORIAL FUND

SUBSCRIPTIONS RECEIVED SINCE THE LAST ANNOUNCEMENT.

	£.	s.	d.
Edwards, William, 67, St. Paul's Churchyard	£10	10	0
Howards and Sons, Stratford	10	10	0
Observer	0	1	8

THE PROPOSED AMENDED BYE-LAWS, AND THE EXISTING BYE-LAWS OF THE PHARMACEUTICAL SOCIETY.

The proposed Bye-Laws are here placed opposite the existing Bye-Laws, in columns, to enable Members more easily to judge of the nature and effect of the intended alterations.

PRESENT BYE-LAWS.

SECTION I.

QUALIFICATION—ADMISSION OF MEMBERS—SUBSCRIPTIONS AND FEES.

1. Pharmaceutical Chemists who may desire to become Members, and are or may have been in business on their own account, or who are Superintendents of a Pharmaceutical establishment, on production of Certificates satisfactory to the Council, shall be eligible to be elected Members of the Society.

2. Chemists and Druggists who commenced business on their own account after the date of the Charter, 18th February, 1843, and prior to the passing of the Act 15 & 16 Vict. cap. 56, 30th June, 1852, and who have been registered as "Chemists and Druggists, certified to be duly qualified for admission as Members of the Society," shall be admitted as Members on payment of the Entrance Fee and the Subscription for the current year. No person whose name is not included in the said register, unless an Associate coming within the terms and meaning of the next following Bye-law, shall, after the Annual

PROPOSED BYE-LAWS.

SECTION I.

MEMBERS' QUALIFICATION, ELECTIONS, AND SUBSCRIPTIONS.

1. Persons who have respectively become Members, Associates, and Apprentices or Students of the Society, pursuant to the Charter of Incorporation, the Act of Parliament, 15 & 16 Vict., cap. 56, and the Bye-laws which have heretofore from time to time been in force, shall continue to be Members, Associates, and Apprentices, or Students respectively, subject to the Bye-laws in force for the time being.

2. Persons qualified to be elected Members, Associates, or Apprentices or Students of the Society, shall at a meeting of the Council be proposed and seconded by Members of the Council. The qualification of the proposed Member, Associate, or Apprentice or Student, shall be stated in a written resolution, which, when proposed and seconded, shall be submitted to the Council; and, when passed, shall confer the right of becoming a Member, Associate, or Apprentice or Student.

3. Persons registered as Pharmaceutical

Meeting to be held in the month of May, 1853, be admitted as a Member of the Society, except in the manner provided in the 10th clause of the Act.

3. Associates of the Society, admitted as such prior to the 1st day of July, 1842, shall be admitted as Members of the Society on the production of Certificates satisfactory to the Council.

4. Superintendents applying to be elected Members, must be proposed and seconded by Members of the Council, who are required in every case to state in writing the grounds of application. The Secretary is to make inquiries respecting the same, and is to report thereon to the Council, and the names of the Candidates are to be exhibited in the Library of the Society for one calendar month previous to election.

5. All persons on the occasion of their being admitted Members, shall sign a Declaration, stating their full names and addresses, and that they will comply with the Bye-laws of the Society. Persons not being Life Members shall agree to pay their Annual Subscriptions at the times and in the manner required by the bye-laws; it shall, nevertheless, be lawful for any Member to commute his Annual Subscription into a Life Subscription.

6. Pharmaceutical Chemists registered under the 10th Clause of the Pharmacy Act, shall, on admission as Members, pay the sum of Five Guineas as a Life Subscription.

7. All Members being such prior to the 1st Day of December, 1853, not being Life Members, shall pay an Annual Subscription or Registration Fee of One Guinea, or in lieu thereof, the sum of Ten Guineas as a Life Member's Subscription.

8. All Annual Subscriptions shall become due on the 1st day of January in each year; and if any Member, Associate, Apprentice, or Student, shall not have paid his Subscription before the 1st day of May in any year, his name shall be omitted from the Register of the Society, certified by the retiring Council at the Annual Meeting. It shall, nevertheless, be at the discretion of any succeeding Council to restore any defaulter to the Society on payment of his arrears and any fine which may be imposed, not exceeding 10*s.* 6*d.*

9. Associates, being such prior to the 1st day of July, 1853, shall pay the Annual Subscription of 10*s.* 6*d.*

10. Associates, admitted as such prior to the 1st day of July, 1853, shall, upon Chemists under Section 10 of the said Act of Parliament, and desirous of becoming Members of the Society, shall make application to the Council in that behalf.

4. Pharmaceutical Chemists being Superintendents of Pharmaceutical establishments, engaged in the confidential management and control of the business of a Chemist and Druggist, and desirous of becoming Members of the Society, shall make application in writing, stating the grounds on which they apply. Their names shall be exhibited in the Library of the Society for one calendar month after application, and if, upon due inquiry made, the grounds of application shall be found sufficient, they shall be elected Members on production of Certificates of qualification satisfactory to the Council.

5. Associates of the Society, who became such before the 1st day of July, 1842, shall be elected Members on the production of Certificates of qualification satisfactory to the Council.

6. Persons registered as Assistants under Section 10 of the said Act of Parliament, and desirous of becoming Associates of the Society, shall make application to the Council in that behalf.

7. Persons registered as Apprentices or Students under Section 10 of the said Act of Parliament shall be eligible for admission as Apprentices or Students of the Society; and, if desirous of being admitted accordingly, shall make application to the Council on that behalf.

8. All persons on election as Members, Associates, or Apprentices or Students, shall sign a written declaration, stating their full names and addresses, and their willingness to comply with the regulations of the Society.

9. All persons who have become Life Members of the Society pursuant to Bye-laws, which have heretofore from time to time been in force, shall be exempt from further contributions to the funds of the Society.

10. All Members of the Society, except Life Members, shall pay an annual subscription of One Guinea.

11. All Associates and Apprentices or Students of the Society shall pay an Annual Subscription of 10*s.* 6*d.*

12. All persons who, prior to the 1st of March, 1862, shall have become Associates, Apprentices, or Students, after examination, and who shall have paid their registration fees pursuant to the Bye-laws then in force, shall be exempt from annual

becoming Members, pay the Annual Subscription of One Guinea, or in lieu thereof the sum of Ten Guineas as a Life Member's Subscription.

11. Registered Apprentices and Students, being such prior to the 1st day of July, 1853, shall pay the Annual Subscription of 10*s.* 6*d.*

12. Registered Apprentices or Students, admitted as such prior to the 1st day of July, 1853, shall, upon becoming Members, be subject to the same conditions as Associates admitted before that date.

13. The Act 15 & 16 Vict., cap. 56, sec. 6, having required that persons being Members of the Pharmaceutical Society, according to the terms of the Royal Charter of Incorporation, should be registered as Pharmaceutical Chemists, and the said Charter having provided that all the Members should subscribe to the funds of the said Society, upon admission or otherwise, as the Council should regulate by any Bye-laws,—IT IS ORDERED that an Annual Subscription or Registration Fee of One Guinea shall be paid by all such persons, and the name of no person shall appear in future registers unless he shall have paid the Annual Registration Fee, or he shall have commuted such Annual Registration Fee by a payment of Ten Guineas.

SECTION II.

HONORARY AND CORRESPONDING MEMBERS.

1. The Council shall, at their discretion, elect as Honorary and Corresponding Members of the Society, such scientific men as have distinguished themselves in any of the branches of knowledge embraced in the educational objects of the Society.

2. The name of each person proposed for election as an Honorary or Corresponding Member of the Society, must be exhibited in the Library for one calendar month prior to his election ; and the party so proposed must be balloted for at the first meeting of the Council next after the expiration of the month.

SECTION III.

COMMON SEAL.

1. The Common Seal of THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN shall

subscriptions to the funds of the Society, as Associates, Apprentices, or Students.

13. All subscriptions for the current year shall become due upon election, and all Annual Subscriptions shall become due on the 1st day of January in every year ; and if any Member, Associate, or Apprentice or Student, shall not have paid his Annual Subscription before the 1st day of May in any year, his name shall be omitted from the Register of Members, Associates, and Apprentices or Students of the Society, certified by the Council at the Annual Meeting. It shall be competent to the Council to restore any defaulter to his former status in the Society on payment of his arrears and any fine which it may be thought fit by the Council to impose, not exceeding 10*s.* 6*d.*

14. All persons who passed the Major Examination before the 1st day of March, 1862, and who, by reason of Registration as Pharmaceutical Chemists under the said Act of Parliament, qualify themselves to be elected Members of the Society, shall, upon election to Membership, have the option of becoming Life Members exempt from further contribution on payment of a Life Subscription of Five Guineas.

15. All Members of the Society, other than those mentioned in the last preceding Bye-law, shall have the option of becoming Life Members exempt from further contribution on payment of a Life Subscription of Twenty Guineas.

SECTION II.

HONORARY AND CORRESPONDING MEMBERS.

1. The Council shall, at their discretion, elect as Honorary and Corresponding Members of the Society such scientific men as have distinguished themselves in any of the branches of knowledge embraced in the educational objects of the Society.

2. The name of each person proposed for election as an Honorary or Corresponding Member of the Society, must be exhibited in the Library for one calendar month prior to his election ; and the party so proposed must be balloted for at the first meeting of the Council next after the expiration of the month.

SECTION III.

COMMON SEAL.

1. The Common Seal of the Pharmaceutical Society of Great Britain shall

consist of the Armorial Bearings, Crest and Motto, registered in Her Majesty's College of Arms.

2. The said Seal shall be deposited in a box, having a lock and two keys, one of which shall be kept by the President, and the other by the Vice-President. The box shall be kept by the Secretary in the iron safe belonging to the Society.

3. Pharmaceutical Chemists registered under Section 10 of 15 & 16 Vict., cap. 56, shall, on their admission as Members, receive a Diploma stamped with the Seal of the Society.

4. The Common Seal shall not be set or affixed to any deed, instrument, or writing whatsoever, unless in the presence of the Council of the Society; and in pursuance of an order or minute entered in their books.

SECTION IV.

BYE-LAWS.

The making, altering, or abrogating any Bye-law shall be in the following manner:—

1. A written formula for any proposed Bye-law, or for altering or abrogating any Bye-law, being delivered by a Member of the Council to the Chairman, shall thereupon be read; and, if seconded and approved, shall be referred to the next meeting of the Council for confirmation, and be subsequently dealt with according to the provisions of the 15 & 16 Vict., cap. 56.

2. A copy of the Bye-laws shall be given to every Member of the Society on his applying for the same.

SECTION V.

ELECTION OF COUNCIL AND AUDITORS.

1. The lot for the retirement of Members of Council shall be taken at the Meeting in February, and the result shall be advertised on or before the 10th day of March. Any Member desirous of nominating another for election as a Member of the Council or an Auditor, and of having the name of the Member so nominated included in the List of Candidates aftermentioned, must give notice thereof in writing to the Secretary, with the Candidate's name and address, before the 25th day of March in each year; and it shall be the duty of the Secretary to ascertain that every Member put in nomination will, if elected, accept the office.

consist of the Armorial Bearings, crest, and motto, registered in Her Majesty's College of Arms.

2. The said Seal shall be deposited at the house of the Society, in a box having a lock and two keys, one of which shall be in the custody of the President, and the other in that of the Vice-President.

3. The Common Seal shall not be set or affixed to any deed, instrument, or writing whatsoever, unless in the presence of the Council of the Society, and in pursuance of an order or minute entered in their books.

SECTION IV.

BYE-LAWS.

The making, altering, or abrogating any Bye-law shall be in the following manner:—

1. A written formula for any proposed Bye-law, or for altering or abrogating any Bye-law, being delivered by a Member of the Council to the Chairman, shall thereupon be read, and, if seconded and approved, shall be referred to the next meeting of the Council for confirmation, and be subsequently dealt with according to the provisions of the 15 & 16 Vict., cap. 56, and the Royal Charter of Incorporation.

2. A copy of the Bye-laws shall be given to every Member of the Society on his applying for the same.

SECTION V.

ELECTION OF COUNCIL AND AUDITORS.

1. Two-thirds of the Members of the Council shall go out of office in every succeeding year, and the Members so retiring shall be those who have been longest in office, computing from their last election. If upon any such retirement more than one-third of the Members of the Council shall have been in office for the same period, the other retiring Members shall be determined by lot.

2. The retiring Members of the Council shall be ascertained and determined at the monthly meeting held in February of every year, and the names shall be advertised on or before the 10th day of March in every year.

In default of the nomination of a sufficient number of persons willing to accept office, the Council shall prepare a List of not less than Fourteen Candidates as Members of the Council for the ensuing year, and also Five Candidates as Auditors, and the Members so named shall respectively be submitted for election at the Annual Meeting. No nominations shall be received after the 24th day of March, except such as may be added by the Council at the Monthly Meeting in April.

2. The Secretary shall issue Voting Papers, and shall therein state the names and residences of the Candidates, and also those Members of the Council who remain in office. The form of the Voting Papers shall be as follows :—

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN,

17, Bloomsbury Square.

In the 3rd clause of the 15 & 16 Vict., cap. 56, being the Act for Regulating the Qualifications of Pharmaceutical Chemists, it is enacted as follows :—

"At all Meetings of the said Society at which votes shall be given for the election of officers, all Members entitled to vote may give their votes either personally, or in cases of residence exceeding five miles from the General Post Office, St. Martin's-le-Grand, London, by voting papers authorized by writing, in a form to be defined by the bye-laws of the said Society, or in a form to the like effect, such voting papers being transmitted under cover to the Secretary not less than five clear days prior to the day on which the election is to take place."

Voting Paper, May, 1853,
For the Election of fourteen persons as Members of the Council.

CANDIDATES.

1*_____	11*_____
2 _____	12 _____
3 _____	13 _____
4 _____	14*_____
5*_____	15*_____
6*_____	16*_____
7 _____	17*_____
8*_____	18*_____
9*_____	19*_____
10 _____	20*_____

The names against which a Star is prefixed are those who are Members of the present Council and who are eligible for re-election.

INSTRUCTIONS FOR VOTING.

Every Member voting must erase the name of all the candidates for whom he does not intend to vote. If more than fourteen names be left, the voting paper will be rejected.

The voting paper, after the erasure of names, must be folded up and enclosed in the accompanying envelope addressed to the Secretary.

3. Any Member of the Society desirous of nominating another Member for election as a Member of the Council or as an Auditor, shall give notice in writing with the name and address of the Candidate to the Secretary of the Society, on or before the 24th day of March in every year ; and the Secretary shall ascertain whether such Candidate will accept office if elected.

4. The Council shall at their monthly meeting, held in April of every year, prepare a list of all persons nominated for election, and eligible to be elected Members of the Council and Auditors for the ensuing year ; and in default of the nomination of a sufficient number of persons willing to accept office, the Council shall nominate as many as may be required to augment the number to fourteen persons to be elected as Members of Council, and five as Auditors. No nominations shall be received after the 24th day of March, except such as may be made by the Council, in the manner and under the circumstances aforesaid, at the monthly meeting in April.

5. The Secretary shall issue to every Member of the Society residing in Great Britain and qualified to vote, not less than ten days prior to the meeting at which Members of the Council and Auditors, or either of them, are to be elected, a voting paper for such elections or election. The names and residences of the Candidates shall appear in such voting papers, and with regard to voting papers for the election of the Council, the names of the Members who remain in office shall also appear.

6. It being enacted by 15 & 16 Vict., cap. 56, that Members residing within five miles of the General Post Office, St. Martin's-le-Grand, London, shall vote personally, and that Members residing beyond that distance may transmit their voting papers under cover to the Secretary, at least five clear days prior to the date of election, the voting papers issued to the London and Country Members respectively shall be in the following forms marked No. 1 and No. 2 :—

To prevent imposition, the Member must sign his name and address on the line on the outside of the envelope.

The following are the Members who remain on the Council after the drawing by lot, in accordance with the provisions of the Charter :—

_____

_____

_____

_____

_____

_____

_____

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN,

17, BLOOMSBURY SQUARE.

Voting Paper, May, 1853, for the Election of five Auditors.

CANDIDATES.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

INSTRUCTIONS FOR VOTING.

Every Member voting must erase the names of all the Candidates for whom he does not intend to vote. If more than five names be left, the Voting Paper will be rejected.

This paper is not to be signed, but is to be folded up and enclosed in the envelope to the Secretary by the post.

Form of address, etc., on envelope :

VOTING PAPER.

Member's Signature_____

Member's Address_____

To the Secretary of the Pharmaceutical Society, 17, Bloomsbury Square, London.

The Voting Paper must be returned to the Secretary by post, on or before the th day of May, .

3. The Secretary shall transmit by post to every Member of the Society, resident in Great Britain, and qualified to vote, not less than ten days prior to the Meeting at which such Officers are to be elected, a Voting Paper, containing the names of those Members who have been proposed as Candidates for election according to the Bye-laws ; and the Voting Papers duly remitted by absent Members shall be opened at such meeting aforesaid, by or in the presence of the Chairman.

4. Prior to the commencement of taking the votes, the Members present shall appoint from among themselves four or more to act as Scrutineers, who shall sum

No. I.—"LONDON MEMBER'S VOTING PAPER, to delivered personally on the day of Election, May , 18 ."

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN,

17, BLOOMSBURY SQUARE.

For the Election of Fourteen Members of the Council.

CANDIDATES.

1 _____	11* _____
2 _____	12 _____
3 _____	13 _____
4 _____	14* _____
5 _____	15* _____
6* _____	16* _____
7 _____	17* _____
8* _____	18* _____
9* _____	19* _____
10 _____	20* _____

The names against which a Star is prefixed, are those who are Members of the present Council, and who are eligible for re-election.

INSTRUCTIONS FOR VOTING.

Every member voting must erase the names of all the candidates for whom he does not intend to vote. If more than fourteen names be left, the Voting Paper will be rejected.

The following are the Members who remain on the Council :—

_____

_____

_____

_____

_____

_____

_____

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN,

17, BLOOMSBURY SQUARE.

Voting Paper, May , 18 , for the Election of Five Auditors.

CANDIDATES.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

INSTRUCTIONS FOR VOTING.

Every Member voting must erase the names of all the candidates for whom he does not intend to vote. If more than five names be left, the Voting Paper will be rejected.

up the votes given for each of the Candidates, and shall sign and make a written return of the total numbers to the Chairman, who shall declare the result of the Election. In case of equality of votes, the vote of the Chairman to be decisive.

5. The Chairman shall have the power, in cases of necessity, of adjourning the Meeting from time to time for the reception of the Scrutineers' Report, the adjournments not extending beyond a period of four days.

No. II.—"COUNTRY MEMBER'S VOTING PAPER, to be delivered personally on the day of Election, May , 18 , or returned to the Secretary in the accompanying envelope on or before the day of May , 18 ."

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN,

17, BLOOMSBURY SQUARE.

For the Election of Fourteen Members of the Council.

CANDIDATES.

1*_____	11*_____
2 _____	12 _____
3 _____	13 _____
4 _____	14*_____
5 _____	15* _____
6*_____	16*_____
7 _____	17*_____
8*_____	18*_____
9*_____	19*_____
10 _____	20*_____

The names against which a Star is prefixed, are those who are Members of the present Council, and who are eligible for re-election.

INSTRUCTIONS FOR VOTING.

Every Member voting must erase the names of all the candidates for whom he does not intend to vote. If more than fourteen names be left, the Voting Paper will be rejected.

The Voting Paper, after the erasure of names, if not intended to be delivered personally, must be folded up, and enclosed in the accompanying envelope addressed to the Secretary.

The prevent imposition, the Member must sign his name and address on the line on the outside of the envelope.

The following are the Members who remain on the Council :—

_____

_____

_____

_____

_____

_____

_____

_____

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN.

17, BLOOMSBURY SQUARE.

Voting Paper, May , 18 , for the Election of Five Auditors.

CANDIDATES.

1_____

2_____

3_____

4_____

5_____

6_____

7_____

INSTRUCTION FOR VOTING.

Every Member voting must erase the names of all the candidates for whom he does not intend to vote. If more than five names be left, the Voting Paper will be rejected.

This paper is not to be signed, but if not intended to be delivered personally, is to be folded up and enclosed in the envelope to the Secretary by post.

Form of Address, etc., on envelope.

VOTING PAPER.

Member's Signature_____

Member's Address _____

To the Secretary of the Pharmaceutical Society, 17, *Bloomsbury Square, London.*

The Voting Paper must be returned to the Secretary on or before the day of May, 18 .

7. Before the votes are taken, the Members constituting the Meeting, shall appoint from among themselves four or more Scrutineers, who shall ascertain the number of votes given for each Candidate, and make a return thereof to the Chairman under their hands, and the Chairman shall then declare the result of the election, and in case of an equality of votes, shall give a second or casting vote. The Voting Papers to be delivered personally shall be received at the General Meeting. The voting papers duly transmitted by absent Members shall be opened by, or in the presence of the Chairman.

8. The Chairman at any Meeting of the election of Members of the Council or Auditors, shall have the power of adjourning such Meeting from time to time, with a view to the reception of the Report of the Scrutineers, but no such adjournment shall extend beyond a period of four days.

SECTION VI.

COUNCIL.

1. The Council shall meet at the Society's House on the first Wednesday in every month, at eleven o'clock in the forenoon. Seven Members shall constitute a quorum, and without that number being present, no business shall be transacted; before other business is entered on, the Minutes of the preceding Monthly, and of any subsequent Meeting or Meetings, shall be read.

2. All Motions of Proposals shall be written, together with the names of the Mover and Seconder, and upon being put shall be decided by a show of hands (except in cases of a Ballot, which may be demanded by any Member); should the numbers be equal, the Chairman shall have

SECTION VI.

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1. The Council shall meet at the Society's house on the first Wednesday in every month at eleven o'clock in the forenoon. Seven Members shall constitute a quorum, and without that number being present no business shall be transacted; before other business is entered on, the minutes of the preceding monthly and of any subsequent Meeting or Meetings shall be read.

2. All motions or proposals shall be written together with the names of the mover and seconder, and upon being put shall be decided by a show of hands, except in cases of a ballot, which may be demanded by any Member. Should the numbers be equal, the Chairman shall

a second or casting vote. It shall be lawful for the Chairman to require a notice in writing of any motion.

3. All resolutions carried at the Meetings of the Council, except such as relate to the Bye-laws, shall be acted upon without confirmation.

4. The Council shall elect from among themselves a Committee for General Purposes—a Committee of Finance—a Committee for the Library, Museum, and Laboratory, and from time to time such other Committees as may be necessary. The Council shall also appoint Boards of Examiners for each year. The President and Vice-President shall be *ex officio* Members of all Committees, and also of the Boards of Examiners; and, if present, one of them shall preside.

SECTION VII.

COMMITTEE FOR GENERAL PURPOSES.

1. This Committee shall consist of Twelve Members, Four of whom shall constitute a quorum. The Committee shall meet as often as may be required, and its proceedings shall be reported to to the Council.

SECTION VIII.

COMMITTEE OF FINANCE.

1. This Committee shall consist of Four Members, Two of whom shall constitute a quorum. The Committee shall meet once or oftener in every month.

2. It shall be the duty of this Committee to regulate and examine the Accounts—to check the receipts of all moneys—to examine all bills, and to present, with the signature of a quorum attached, such as are approved for payment at the Monthly Meetings of the Council. This Committee shall also prepare a Balance Sheet for the Auditors previous to the Annual Meeting.

SECTION IX.

THE COMMITTEE FOR THE LIBRARY, MUSEUM, AND LABORATORY.

1. This Committee shall consist of not less than Four Members, Two of whom shall constitute a quorum. The Committee shall meet once in every month, and report from time to time to the Council.

2. It shall be the duty of this Committee to superintend the arrangement and preservation of the Books, Specimens, and

have a second or casting vote. It shall be lawful for the Chairman to postpone or adjourn to the next Meeting any motion whereof notice in writing has not been given at a prior Meeting.

3. All resolutions carried at the Meetings of the Council, except such as relate to the Bye-laws, shall be acted upon without confirmation.

4. The Council shall elect from among themselves a Committee for General Purposes, a Committee of Finance, a Committee for the Library, Museum, and Laboratory, and from time to time such other Committees as may be necessary. The President and Vice-President shall be *ex officio* Members of all Committees, and if present, one of them shall preside.

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1. This Committee shall consist of not less than Twelve Members, Four of whom shall constitute a quorum. The Committee shall meet as often as may be required, and its proceedings shall be reported to the Council.

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COMMITTEE OF FINANCE.

1. This Committee shall consist of not less than Four Members, Two of whom shall constitute a quorum. The Committee shall meet once or oftener in every month.

2. It shall be the duty of this Committee to regulate and examine the accounts, to check the receipt of all moneys, to examine all bills, and to present at the monthly meetings of the Council such as shall have been approved for payment, with the signature of a quorum attached. This Committee shall also prepare a balance sheet for the Auditors previous to the Annual Meeting.

SECTION IX.

THE COMMITTEE FOR THE LIBRARY, MUSEUM, AND LABORATORY.

1. This Committee shall consist of not less than Four Members, Two of whom shall constitute a quorum. The Committee shall meet once in every month and report from time to time to the Council.

2. It shall be the duty of this Committee to superintend the arrangement

Apparatus; and to make regulations for the admission of Visitors and Students to the Library, Museum, and Laboratory.

3. All communications made to the Society for the purpose of being read and discussed at the Evening Meetings, or for insertion in the Transactions, must first have the sanction of at least Three Members of this Committee.

SECTION X.

BOARDS OF EXAMINERS AND EXAMINATIONS.

1. There shall be separate Boards of Examiners for England and Scotland.

2. Each Board shall consist of not less than six Pharmaceutical Chemists, exclusive of the President and Vice-President of the Society, who shall be *ex officio* Members of both Boards. The Council may appoint Professors of Science to assist as Examiners. Five Members of the Board shall constitute a quorum.

3. Each Board shall, if needful, sit once or oftener every month, and report to the Council at its next Monthly Meeting.

4. The Boards shall make such regulations from time to time as shall seem to them expedient for conducting the Examinations, such regulations to be subject to the confirmation of the Council of the Society, and inserted in the Transactions. The amount of knowledge and qualification required of all persons undergoing the Major and Minor Examinations, shall be subject to the discretion of the Examiners for the time being.

5. The subjects of the Major and Minor Examinations shall be as follows :—

Translation and Dispensing of Prescriptons.

Pharmacy.

General Chemistry.

The Chemistry of Poisons; and Posology.

Materia Medica and the Natural History of Medicines.

Botany.

Persons entering the Society under the 10th clause of the Pharmacy Act shall be subject to the following rules :—

6. Apprentices and Students, previous to Registration, shall be examined as to their knowledge of the Latin language; but those residing more than ten miles from London or Edinburgh, shall furnish such certificates of proficiency as the respective Boards may require.

7. Persons passing the Classical Exa-

and preservation of the books, specimens, and apparatus, to inspect the Laboratory, and to make regulations for the admission of visitors and students to the Library, Museum, and Laboratory.

SECTION X.

EXAMINERS—EXAMINATIONS—FEES.

1. The Council of the Society shall, at the first Monthly Meeting after the General Meeting in every in every year, appoint two Boards of Examiners, one for England and Wales and the other for Scotland.

2. The President and Vice-President of the Society shall, *ex officio*, be Members of the Boards of Examiners, and shall preside at all Meetings of such Boards at which they shall be present.

3. The Board for England and Wales shall consist of not less than six Pharmaceutical Chemists, exclusive of the President and Vice-President of the Society. The Board for Scotland shall consist of not less than four Pharmaceutical Chemists, exclusive of the President and Vice-President of the Society. The Council of the Society may from time to time appoint Professors of Science to assist either of the Boards of Examiners at any of their Examinations. Five Members of the Board of Examiners for England and Wales, and three Members of the Board of Examiners for Scotland, exclusive in each case of assistant Professors, shall constitute a quorum.

4. The Boards of Examiners shall meet for the purpose of conducting Examinations at such times during every month as the Council of the Society, at each Monthly Meeting, or at any Special Meeting, shall direct; and such Boards respectively shall report the result of every Examination to the Council of the Society at the Monthly Meeting immediately following the same.

5. The Boards of Examiners shall conduct all Examinations according to such regulations as shall be made or adopted by them from time to time, and as shall have been approved by the Council of the Society. Such regulations shall from time to time be inserted in the published Report of the Transactions of the Society.

6. The Council of the Society shall from

mination shall pay a fee of Two Guineas, and have their names inserted on the Register as Apprentices or Students.

8. Registered Apprentices or Students passing the Minor Examination, shall pay a fee of Three Guineas, and be registered as Assistants.

9. Candidates, not being Registered Apprentices or Students, passing the Minor Examination, shall pay a fee of Five Guineas, and be registered as Assistants.

10. Registered Assistants passing the Major Examination, shall pay a fee of Five Guineas, and be registered as Pharmaceutical Chemists.

11. Candidates not being Registered Assistants, passing the Major Examination, shall pay Ten Guineas, and be registered as Pharmaceutical Chemists.

12. No person shall be admitted to the Major Examination, who shall not have attained the age of twenty-one years.

SECTION XI.

REGISTRAR AND REGISTRATIONS.

1. The Registrar shall receive and preserve the Pass Certificates granted by the time to time supply any vacancy in the office of Examiner, and may remove any Member of the Board of Examiners, and substitute another person in his place; and may also from time to time appoint a Special Examiner, or Special Examiners, to conduct any such Examination, as to knowledge of the Latin language, as mentioned in the next following Bye-law.

7. The Examinations shall be three in order or number. The first in order shall be an examination as to knowledge of the Latin language. The second in order shall be an examination as to knowledge of subjects connected with Pharmaceutical Chemistry, and shall be called the Minor Examination. The third in order shall be a more extended examination as to knowledge of the last-mentioned subjects, and shall be called the Major Examination.

8. The subjects of the Minor and Major Examinations shall be translation and dispensing of Prescriptions, Pharmacy, General Chemistry, the Chemistry of Poisons, Posology, Materia Medica, and Botany.

9. All persons, before Registration as Apprentices or Students, shall pass an Examination as to knowledge of the Latin language, and shall pay a fee of Two Guineas, whereupon they shall be registered under the said Act of Parliament as Apprentices or Students.

10. All persons, before Registration as Assistants, shall pass the Minor Examination, and shall pay a fee of Three Guineas if previously registered as Apprentices or Students, or otherwise a fee of Five Guineas, whereupon they shall be registered under the said Act of Parliament as Assistants.

11. All persons, before Registration as Pharmaceutical Chemists, shall pass the Major Examination, and shall pay a fee of Five Guineas if previously registered as Assistants, or otherwise a fee of Ten Guineas, whereupon they shall be registered under the said Act of Parliament as Pharmaceutical Chemists.

12. No person shall be admitted to the Major Examination who shall not have attained the age of twenty-one years.

SECTION XI.

REGISTRAR AND REGISTRATIONS.

1. The Registrar shall receive and preserve all cards or tickets issued by the Examiners, signifying that Examinations have been passed.

Boards of Examiners, and register the names of the Candidates, with their addresses, and the dates of their Examinations in the several registers, according to the respective titles expressed in such Certificates; namely, for the Major Examination, the title of Pharmaceutical Chemist; for the Minor Examination, the title of Registered Assistant; and for the Classical Examination, the title of Registered Apprentice or Student, as the case may be.

2. The Associates of the Society admitted prior to the first day of July, 1842, shall, upon being elected Members, produce to the Registrar the Certificate of the Council; and the Registrar shall thereon remove the names of such Associates from the Register of Assistants, and register them as Pharmaceutical Chemists and Members of the Society.

3. Registered Assistants passing the Major Examination, or Registered Apprentices or Students passing the Minor Examination, shall be severally removed from such Registers, and their names be entered in such other Registers as shall be authorized by the respective Certificates last granted by the Boards of Examiners.

4. The Registers of Pharmaceutical Chemists, Assistants, and Apprentices, or Students, who are registered under the 10th clause of the Pharmacy Act, or who have paid the Composition in lieu of the Annual Subscriptions to the Society, shall be revised annually, and laid before the Members at the Annual Meeting in May.

5. The Registers of all persons paying Annual Subscriptions to the Society, shall be renewed annually on payment of their several subscriptions; and such Registers shall also be laid before the Members at the Annual Meeting in May; and the name of any Member failing to pay his Annual Subscription on or before the 1st day of May, shall be omitted from the Register of Pharmaceutical Chemists.

2. The Registrar shall from time to time make out and maintain a Register of all persons being respectively Members, Associates, and Apprentices or Students of the Society, and a Register of all persons entitled to be registered under the said Act of Parliament, with proper indices of such registers respectively.

3. The names of persons registered as Apprentices or Students of the Society shall, upon their election as Associates, be removed from the Register of Apprentices or Students, and placed upon the Register of Associates.

4. The names of persons registered as Apprentices or Students, or as Associates of the Society shall, upon their election as Members, be removed from the Register of Apprentices or Students, or the Register of Associates, as the case may be, and be placed upon the Register of Members.

5. The names of persons registered as Apprentices or Students under the said Act of Parliament shall, upon their being registered as Assistants, be removed from the Register of Apprentices or Students.

6. The names of persons registered as Apprentices or Students, or as Assistants under the said Act of Parliament shall, upon their registration as Pharmaceutical Chemists, be removed from the Register of Apprentices or Students, or the Register of Assistants, as the case may be.

7. All the said Registers shall be revised annually, and laid before the Annual General Meeting of the Society.

8. Persons who have not been examined under the said Act of Parliament who have been registered as Pharmaceutical Chemists by reason of their election as Members of the Society, and who have not paid life subscriptions, shall pay the annual subscription required from Members; and the names of all such Members as last mentioned who fail to pay their annual subscription before the first day of May in any year, shall be omitted from the Register of Pharmaceutical Chemists.

SECTION XII.

TREASURER.

It shall be the duty of the Treasurer to receive all moneys; to pay such accounts as the Council may order by the signature of Six Members of the Council in Council assembled, and to render his account at each Monthly Meeting.

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1. It shall be the duty of the Treasurer to receive all moneys, to pay such accounts as the Council may order by the signature of Six Members of the Council in Council assembled, and to render his account at each monthly meeting.

SECTION XIII.

SECRETARY.

1. The Secretary shall have authority over the servants of the establishment, whose wages he shall pay. He shall be in attendance at his office from 9.30 a.m. to 5 p.m., every day except Saturday; and be present at all Meetings of the Council and Committees, General and Special Meetings, and also at the Evening Meetings and Lectures. It shall be his duty to superintend the affairs of the Society, under the direction of the Council and Committees. He shall keep the books of the Society in a neat and orderly manner; shall conduct the correspondence, and issue all summonses; take the minutes of all meetings for business, and read them, and make a report of all matters that come under his cognizance for the information of the Council and Committees. He shall consult the President or Vice-President on any business requiring attention between the various meetings, and be responsible for the safe custody of all the documents and property belonging to the Society which are under his control.

2. He shall find security in the sum of £300, and shall receive all Subscriptions, Fees, and Donations, and give a printed receipt for the same, and no other, checking each receipt. He shall every Saturday transact any business of the Society that may be required out of doors, and pay to the Treasurer the amount of moneys received by him during the week. He shall receive such a sum in advance for petty cash and servants' wages as the Council may order, and account for the same to the Finance Committee; but shall not out of such sum pay any account exceeding forty shillings. He shall also superintend the transmission of the Transactions.

SECTION XIV.

AUDITORS.

The Auditors shall be summoned by the Secretary, at least one month previous to the Annual Meeting; it shall be their duty to inspect the Accounts of the Society, and the Balance Sheet prepared for them by the Finance Committee, which must be certified and signed by them, and be presented to the Council at their Meeting in May.

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SECTION XV.

SUMMONSES.

1. Printed Summonses shall be issued by the Secretary, with his name attached; and if left at the Member's place of business, or transmitted by post, shall be considered as received.

2. Summonses must be issued at least three clear days previous to the Council and Committee Meetings, inclusive of the day of issuing the same, except in the case of Special Meetings; and all notices of Motions must be inserted therein, and also notice of such matters as require particular consideration, including the names of candidates proposed for election as Members, and distinguishing those who are proposed as Honorary or Corresponding Members or Superintendents.

3. On the receipt of any requisition duly signed, the Secretary shall issue Summonses for a Special Council or General Meeting; if for the latter, not less than ten clear days' previous notice shall be given, and such Summonses shall contain full notice of the business to be discussed at the said Special Meeting.

4. Cards of invitation to the Pharmaceutical Meetings and Evening Lectures shall be issued by the Secretary, in the name of the Council, to such visitors as the Council may determine; and each Member of the Society may, on application to the Secretary, obtain a card for the admission of a friend, to which his own signature must be attached.

SECTION XV.

SUMMONSES

FOR ALL MEETINGS OF THE COUNCIL, COMMITTEES, OR AUDITORS.

1. Printed Summonses shall be issued by the Secretary, with his name attached; and if left at the place of business, or transmitted by post, addressed to the place of business or residence of the person summoned, shall be considered as received.

2. All Summonses shall be issued at least three clear days previous to the Meetings, inclusive of the day of issuing the same, except in the case of Special Meetings; and all notices of Motion shall be inserted therein, and also notice of such matters as require particular consideration, including the names of persons who are proposed for election as Honorary or Corresponding Members or Superintendents.

3. The Secretary shall issue summonses, notices, or advertisements, convening Special Council or General Meetings. If for the latter, not less than ten clear days' previous notice shall be given; and such summonses, notices, or advertisements shall contain full notice of the business to be discussed at the Special Meeting.

4. Cards of invitation to the Pharmaceutical Meetings and Evening Lectures shall be issued by the Secretary in the name of the Council, to such persons as the Council may direct; and each Member of the Society may on application to the Secretary, obtain a card for the admission of a friend, to which his own signature must be attached.

SECTION XVI.

FILLING UP VACANCIES BY DEATH, RESIGNATION, OR REMOVAL.

1. In the event of any vacancy occurring in the office of President, Vice-President, or Treasurer, the Secretary shall report the same and the cause thereof, in the summons for the next Meeting of the Council, who shall thereupon find and declare such vacancy, and immediately proceed to elect from their remaining number a proper person to fill such vacant office.

2. In the event of any vacancy occurring in the Council or Auditors, or in the several Committees, or in the Board of Examiners, during the current year, the Secretary shall report such vacancy, and the cause thereof, in the sum-

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1. In the event of any vacancy occurring in the office of President, Vice-President, or Treasurer, the Secretary shall report the same, and the cause thereof, in the summons for the next Meeting of the Council, who shall thereupon find and declare such vacancy, and immediately proceed to elect from their remaining number a proper person to fill such vacant office.

2. In the event of any vacancy occurring in the Council or Auditors, or in the several Committees, during the current year, the Secretary shall report such vacancy, and the cause thereof, in the summons for the next Meeting of the

mons for the next Meeting of the Council, at which some Member of the Council, or of the Society, as the case may require, shall be nominated to fill up such vacancy.

3. In the event of a vacancy occurring in the office of Secretary, during the current year, the President or Vice-President shall appoint some person *pro tempore*, to fulfil the duty of the office, and in the summons for the next Meeting of the Council the vacancy shall be declared; and some person or persons being proposed and seconded at such Meeting, the election shall take place, but shall not be final, unless confirmed at the subsequent Meeting.

SECTION XVII.

REMOVAL OF OFFICERS AND MEMBERS.

1. Every Member of the Council who shall commit any act or acts which appear to the Council derogatory to the honour of his office, shall give an explanation of the same to the Council on being required so to do; and in default thereof, or if such explanation be unsatisfactory to the Members present, he shall be liable to the censure of the Council, or if it be deemed expedient, a notice may be given by any Member of the Council for a motion of removal from the Society of the Member so offending, which notice shall be inserted in the summons for the ensuing Meetings of the Council until disposed of, and shall be taken into consideration at the first ensuing Meeting of the Council at which Twelve Members thereof shall be present.

2. If any report be made to the Council by a Member of the Society in writing, with his name attached, that another Member has been guilty of any act or conduct which in the opinion of the Council is contrary to, or subversive of, the interests of the Society, or a violation of its laws and regulations, the Secretary shall write to the Member so accused for an explanation, and in default of explation, or if the same be unsatisfactory, Two Members of the Council shall be deputed to communicate, personally or by letter, with such Member, and shall report the result to the Council; when any Member of the Council shall, if he think it expedient, give notice of a motion for the removal of such member from the Society. This notice must be inserted in the summons for the ensuing Meetings

Council, at which some Member of the Council, or of the Society, as the case may require, shall be nominated to fill up such vacancy.

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1. Every Member of Council who shall commit any act or acts which appear to the Council derogatory to the honour of his office, shall give an explanation of the same to the Council, on being required so to do, and in default thereof, or if such explanation be unsatisfactory to the Members present, he shall be liable to the censure of the Council, or, if it be deemed expedient, a notice may be given by any Member of the Council for a motion of removal from the Society of the Member so offending, which notice shall be inserted in the summons for the ensuing Meetings of the Council until disposed of, and shall be taken into consideration at the first ensuing Meeting of the Council at which Twelve Members thereof shall be present.

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of the Council, until disposed of; and be taken into consideration at the first Meeting thereof at which Twelve Members are present.

3. Any Member desiring to retire from the Society shall send notice thereof to the Secretary in writing, together with the Diploma of Membership. No Member shall be released from his obligation to pay his Annual Subscription, until such time as the Diploma of Membership shall have been returned.

SECTION XVIII.

GENERAL FUND.

1. The Council shall from time to time cause such surplus moneys to be invested as may not in their judgment be requisite for carrying on the business of the Society.

2. All investments shall be made in Government or real securities, and be in the names of three persons, to be appointed Trustees by the Council. On becoming Trustees they shall sign a declaration of their trust, and their readiness to relinquish it at the request of the Council.

3. No sale or disposal of the whole or any part of the Trust Funds shall be effected, except in pursuance of an order of the Council, signed by Six Members at the least, assembled in Council.

SECTION XIX.

BENEVOLENT FUND.

1. This Fund shall consist of Donations and Subscriptions made for the particular Fund, in addition to the sum already invested.

2. The Donations shall be invested in Government or real securities in the names of three persons to be appointed Trustees by the Council. On becoming trustees they shall sign a declaration of their trust, and their readiness to relinquish it, at the request of the Council. No appropriation of any part of the principal shall at any time be made for distribution amongst the recipients of relief.

3. The interest to accrue from the Fund, together with the subscriptions which shall annually be made in aid of the Benevolent Fund, shall be applicable taken into consideration at the first Meeting thereof at which Twelve Members are present.

3. Any Member desiring to retire from the Society, shall send notice thereof to the Secretary in writing, together with the Diploma of Membership. No Member shall be released from his obligation to pay his Annual Subscription until such time as the Diploma of Membership shall have been returned.

SECTION XVIII.

FUNDS AND PROPERTY.

1. The Council of the Society shall from time to time cause such part of the funds in the hands of the Treasurer as may not, in their judgment, be required for carrying on the business of the Society, to be invested in Government or real securities in the corporate name of the Society.

2. All property belonging to the Society now held, laid out, or invested by, or in the names of Trustees, and including both the General and Benevolent Funds, shall be conveyed, assigned, and transferred, so as to become vested in the Society, in its corporate name and capacity.

3. The property and funds of the Society, other than moneys from time to time in the hands of the Treasurer or Secretary, shall not be disposed of, or otherwise dealt with, except in pursuance of an order of the Council of the Society, signed by Six Members at the least, in Council assembled.

SECTION XIX.

BENEVOLENT FUND.

1. The Benevolent Fund shall consist of donations and subscriptions towards the particular objects of such Fund, in addition to the sum already invested in respect of the same Fund.

2. Donations in aid of the Benevolent Fund shall be invested in Government or real securities; and no part of the invested capital of such Fund shall be distributed among the recipients of relief.

3. The interest to accrue from the invested portion of the Benevolent Fund, together with annual subscriptions in aid thereof, shall be applicable, at the discretion of the Council, towards the relief of distressed Members or Associates of the Society, and their Widows and Orphans respectively; and any unapplied surplus

in such manner as the Council shall direct, towards the annual or other relief of Members and Associates, or their Widows or Orphans, and any surplus shall be added to the invested Benevolent Fund.

4. The persons who shall be eligible to receive relief from the Benevolent Fund, shall be such necessitous Members and Associates as may be of not less than four years' standing in the books of the Society, and the Widows and Orphans of such Members or Associates as shall be in necessitous circumstances.

SECTION XX.

ANNUAL AND SPECIAL GENERAL MEETINGS.

1. The Council shall prepare a Report of their Proceedings during the past year, together with a Statement of the Funds, which shall be read at the General Meeting, and inserted in the Transactions.

2. The Council shall meet previous to the General Meeting, and arrange the business to be transacted thereat; and the Proceedings of the General Meeting shall be considered perfect in themselves. It shall not be necessary to read or confirm the Minutes of the preceding Annual Meeting.

3. No business shall be brought forward at any Special General Meeting but that for which it was convened, and of which due notice has been given to the Members of the Society.

SECTION XXI.

DIPLOMA AND CERTIFICATES.

1. The Plates of the Diploma and Certificates of the Society shall be deposited at the House of the Society in a box, having a lock and two keys, one of which shall be in the custody of the President and the other of the Vice-President. No copy shall be printed without an express order of the Council; and all copies so ordered and printed shall be in the custody of the Secretary. None shall be filled up without an order of the Council in writing; and no Certificate or Diploma, when filled up, shall be delivered to any Member or Associate until after payment of his Subscription or Fees. The date of the delivery shall be registered by the Secretary, in a book kept expressly for that purpose.

2. The Diploma shall be signed by the

shall be annually added to the invested capital of the same Fund.

4. Persons eligible for relief from the Benevolent Fund shall be such necessitous Members or Associates of the Society whose connection with the Society shall be of not less than four years' date, and such Widows and Orphans of Members or Associates as shall be in necessitous circumstances.

SECTION XX.

ANNUAL AND SPECIAL GENERAL MEETINGS.

1. The Council shall prepare a Report of their Proceedings during the past year, together with a Statement of the Funds, which shall be read at the Annual General Meeting, and inserted in the published Report of the Transactions of the Society.

2. The Council shall meet previous to the General Meeting, and arrange the business to be transacted thereat; and the Proceedings of the General Meeting shall be considered perfect in themselves without the necessity of reading or confirming the Minutes of the preceding Annual Meeting.

3. No business shall be brought forward at any Special General Meeting but that for which it is convened, and of which due notice has been given to the Members of the Society, pursuant to the preceding Bye-law, No. 3, under sec. 15.

SECTION XXI.

DIPLOMA AND CERTIFICATES.

1. Every Member of the Society shall, upon payment of his subscription, be entitled to a Diploma of Membership in such form as shall from time to time be determined upon by the Council.

2. Persons registered as Pharmaceutical Chemists under Section 10, 15 & 16 Vict., cap. 56, on being duly elected Members of the Society shall be entitled to a Diploma of Membership stamped with the seal of the Society.

3. All persons examined pursuant to the said Act of Parliament and the foregoing Bye-laws, shall, after having passed their examinations and paid their examination fees, receive certificates in such form as shall from time to time be determined upon by the Council.

4. All plates used from time to time for

President and Vice-President, and countersigned by the Secretary; the Certificates shall be signed by the Board of Examiners; but no Diploma shall be signed or Certificate delivered, without a Report from the said Board, unless the Member be elected by the Council.

3. Persons presuming to pirate the Diploma, Certificates, or Common Seal, or putting themselves forth to the public as Members of this Society who are not such, or imitating the Diploma, Certificates, or Common Seal, or falsely stating on their bills, labels, circulars, or otherwise, that they are Members, are to be proceeded against at law, according to the order of the Council.

printing the forms of the said Diploma and Certificates shall be deposited at the house of the Society, in a box having a lock and two keys, one of which shall be in the custody of the President and the other in that of the Vice-President.

5. No print shall be taken from the said plates, or any or either of them, without an express order of the Council. All prints taken shall be in the custody of the Secretary, but no print shall be filled up without an express order of the Council, which order, with regard to Certificates, shall from time to time be made, on the receipt of Reports from the Board of Examiners.

6. Every Diploma shall be signed by the President and Vice-President, and countersigned by the Secretary. Every Certificate shall be signed by the Board of Examiners, or those members thereof who conducted the examination to which each Certificate relates.

7. Every person ceasing to be a Member of the Society shall forthwith deliver up to such person as the Council shall order the Diploma of Membership furnished to him pursuant to the preceding Bye-laws.

8. All persons pirating or imitating the Diploma, or any or either of the Certificates, or the Common Seal of the Society, or falsely holding themselves forth to the public by means of advertisements, handbills, labels, circulars, or otherwise, as Members of the Society, or registered under the said Act of Parliament, shall be subject to such legal proceedings as the Council shall from time to time order.

SECTION XXII.

JOURNAL AND TRANSACTIONS.

1. The PHARMACEUTICAL JOURNAL (the copyright of which now belongs to the Society) shall be edited, printed, and published in such manner as the Council shall from time to time direct.

2. The Transactions of the Society required by the preceding Bye-laws to be published, shall be inserted in the said Journal, and all notices or advertisements shall be considered duly made or given if inserted therein.

SECTION XXIII.

PHARMACEUTICAL MEETINGS.

1. Evening Meetings may be held at the house of the Society, as the Council shall from time to time direct, for the read-

ing of papers and discussion of subjects relating to the objects of the Society.

2. Notice of such Meetings shall be given in the "Pharmaceutical Journal" next preceding.

3. All communications intended to be made at such Meetings shall be submitted to the President, or, in his absence, to the Vice-President, or to the Chairman of the Meeting for his sanction, and without such sanction no subject shall be introduced.

FORM OF BEQUEST

TO THE GENERAL OR BENEVOLENT FUND.

"*I give and bequeath the sum of unto the Trustees of the* PHARMACEUTICAL SOCIETY OF GREAT BRITAIN, *the same to be paid out of my personal estate, in trust to be applied to the uses and purposes of the* GENERAL OR BENEVOLENT FUND *of the said Society.*"

N.B.—Devises of land, and bequests of money charged on lands (or to be laid out in lands or tenements), to or for the benefit of the Society, will be void by the statutes of Mortmain.

FORM OF BEQUEST.

TO THE GENERAL OR BENEVOLENT FUND.

"*I give and bequeath the sum of unto the* PHARMACEUTICAL SOCIETY OF GREAT BRITAIN, *the same to be paid out of my pure personal estate, and to be applied for the purposes of the* GENERAL OR BENEVOLENT FUND *of the said Society.*

N.B.—Devises of land and bequests of money savouring of realty, or, in other words, connected in any way with land, will be void.

PHARMACEUTICAL MEETING,

Wednesday, December 4th, 1861.

MR. PETER SQUIRE, PRESIDENT, IN THE CHAIR.

The following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced, and the thanks of the Society given to the respective donors.

The Journal of the Society of Arts.
The Photographic Journal.
The Répertoire de Chimie.
The Dental Review.
The Chemist and Druggist. From the Editors.
The Transactions of the Medico-Chirurgical Society, vol. xliv. From the Society.
An Enumeration of Ceylon Plants. By G. H. K. Thwaites, Esq. Part 4. The Author.
Die Burtscheider Thermen bei Aachen. Von Drs. Hamberg and Lerseh. From the Authors.
Two specimens of *Bovista gigantea.* From Mr. Bird.
Specimens of Kokum Butter, or Concrete Oil of Mangosteen (*Garcinia purpurea*).
Preserved Root of Daphne Laurcola.
Preserved Root of Daphne Mezereum. From Mr. Squire.
A Specimen of the Fat extracted from Dika Bread. From Mr. J. Attfield.
Ten Specimens of Extracts with saline Efflorescences *in situ.*
Ten ditto of the efflorescences mounted on slides for the microscope. Mr. Attfield.
An Inhaler. Mr. Palmer.

ON MEDICINAL EXTRACTS; TAKING BELLADONNA AS AN EXAMPLE.

BY PETER SQUIRE, F.L.S.

The discussion of the subject of this paper, a report of which is given in the last number of this Journal at page 300, was resumed this evening, having been adjourned from the previous meeting.

The PRESIDENT, in introducing the subject, said he thought it might be well for him to state on behalf of the Society, that nothing that had been said at the previous meeting was to be understood as justifying a deviation from the instructions given in the Pharmacopœia for the preparations ordered there. The Society was anxious on all occasions to maintain the authority of the Pharmacopœia, and to impress upon its members the importance of adhering, as far as possible, to the directions given by the College. This was especially the case since the Society had been requested to assist in revising the Pharmacopœia processes; but while it was more than ever important that they should inculcate obedience to the orders given, it was, at the same time, very desirable that the processes of the Pharmacopœia should be such as practical men could adopt with advantage, and such as would fully realize the intentions of those who gave them. With reference to the preparation of extracts, he thought the authors of the Pharmacopœia had not been sufficiently acquainted with the practice of the manufacturers of such preparations, and that advantage was likely to result from bringing the experience of those largely engaged in the manufacture of medicinal extracts under the notice, not only of the members of the Pharmaceutical Society, but also of the medical profession.

Having made these prefatory remarks, he would proceed to add a few facts to those contained in his paper, and which may offer some further points for discussion. In the paper read at the last meeting he had given the substance of the reports furnished him by several medical men of the comparative efficacy of two extracts, one marked A, made from the stalks, and the other marked B, made from the leaves, of the belladonna plant. All the reports agreed in ascribing greater efficacy to A than to B. Since the last meeting, he had received another report from Mr. White Cooper, who stated that he found the extract marked A fully one-fourth stronger than that marked B, thus confirming the opinions previously given.

He would now refer to some of the foreign Pharmacopœias, with the view of pointing out what the practice of Continental pharmaceutists was in reference to the preparation of extracts. The French Codex naturally came first; but as this work was published more than a quarter of a century ago, and as a new one was now in course of preparation, he would pass it over, and refer to other Continental pharmacopœias of more recent date.

The Prussian Pharmacopœia of 1854 orders 10 lbs. of the leaves and flowering branches to be bruised with $1\frac{1}{2}$ lb. of water and pressed; the mark treated with more water and again pressed, the liquors strained, evaporated to 2 lbs., mixed with 2 lbs. of rectified spirit, filtered and evaporated to the consistence of an extract.

There is also another preparation, called "Dry Extract," which is made by taking 4 oz. of the above extract, drying it, and mixing it with 1 oz. of sugar of milk, or a sufficient quantity to make up the weight of the mixture to 4 oz. The two extracts are thus made of the same strength.

In the Belgian Pharmacopœia of 1854, the flowering herb is directed to be bruised, a small quantity of water to be added, pressed, strained, the liquor

evaporated to one-fourth, or to a syrupy consistence, then spread on dishes and evaporated to dryness.

An extract is also directed to be made without straining.

Also an alcoholic extract, for the production of which the green plant is treated with spirit, pressed, the liquor strained and evaporated.

In the Austrian Pharmacopœia of 1855 the process is the same as the Belgian, but the evaporation is continued to dryness.

The United States Pharmacopœia of 1855 directs the juice of the leaves to be evaporated after the separation of the chlorophyll and albumen. It also orders an alcoholic extract from the dried leaves.

The Norwegian Pharmacopœia of 1854 directs the dried leaves to be treated with boiling water, and afterwards with rectified spirit, and the liquor evaporated to an extract. It also orders a dry extract with sugar of milk.

It would be interesting to learn what the relative properties and effects were of the extracts made by the several processes of the foreign pharmacopœias.

Dr. Redwood said he much regretted that he had been prevented by indisposition from attending the previous meeting, especially as it appeared from the report of it that much interesting matter had been brought forward in the paper which was read, and the discussion which followed it. He could not help feeling, however, after reading the report, that the subject had been left in rather an unsatisfactory position, and he was therefore glad the discussion had been resumed. There were three points especially with reference to which he felt dissatisfied with the result of the previous meeting's proceedings.

In the first place, he thought there was an implied justification, to some extent, of a deviation by manufacturers from the instructions given in the Pharmacopœia. Anything to this effect, emanating from the Society, was, he thought, especially to be avoided, and he was glad therefore that the President had, on the present occasion, done his best to counteract the effect of any unguarded expressions which may have been previously used.

The second point in the discussion to which he wished to allude was that which related to the comparative efficacy of the juices of the leaves, and of the stalks of the plants, from which the extracts under notice were made. He feared some misapprehension with reference to this point might exist, and, indeed, he had met with more than one member of the Society, well versed in the subject of extracts, who had mistaken the purport of the representations made at the last meeting as to the comparative strength of the two extracts which had been submitted to trial. The extract referred to as that marked A has been designated the extract of the juice of the stalks, and the President had thus designated it on the present occasion, in referring to the report he had received from Mr. White Cooper, which represented extract A as one-fourth stronger than the extract made from the leaves of the plant. He was aware that a careful perusal of the President's paper would show that the extract A was not made from the juice of the stalks alone, but from the small stems, together with the flowers and fruit; yet, as it had been designated, in speaking of its comparative efficacy, as the extract made from the stalks, it was probable that many would conclude from this, as some he knew had already concluded, that the stalks yielded not only a better-keeping, but also a more active, extract than that made from the leaves. This opinion would, no doubt, be readily adopted by those who made extracts for sale; and if the stalks really gave a better extract than the leaves, why should they not be used for this purpose to the exclusion of the leaves, while the latter might be sold in the dried state, or made into powder? It was important that nothing should go forth having a semblance of authority from the Society for such

a mode of preparing the extracts of the green medicinal plants. There was, indeed, nothing in Mr. Squire's paper that really justified such a conclusion, and he (Dr. Redwood) only regretted that the author, who was a high authority, and to whom pharmaceutists were indebted for several valuable contributions on the subject of extracts, had not more cautiously guarded himself against a misconception of some of the points adverted to in his paper. In the experiments referred to at the previous and the present meeting, there was nothing to show that the extract made from the stalks possessed any medicinal efficacy, as no trial had been made of an extract derived exclusively from that source. The extract marked A had been made from the small succulent stems, together with the flowers and fruit, and there was no statement of the relative proportions of these, nor were there any means of ascertaining how much of the efficacy of this extract was due to the flowers and fruit, and how little of it to the stalks. The opinion hitherto entertained among those considered to be well-informed upon the subject was, that the juice of the leaves was much more highly charged with the active constituents of the medicinal plants referred to than was the juice of the stalks, and the Pharmacopœia therefore ordered the more highly elaborated juices of the leaves to be exclusively used for making these extracts. There was reason to believe that the flowers and fruit, as well as the leaves, contained the active elaborated juices; and this was probably also the case, to a certain extent, with the smaller stems to which the flowers were attached; he therefore thought the definition which had been suggested by Mr. Squire himself, some time ago, of the parts of the plants which should be used for making extracts was a good one—namely, "the leaves and flowering tops;" but he would rather see the definition restricted to the leaves alone than so worded as to give the semblance of a licence to the manufacturer to use the stalks of the plants.

The next and last point to which he had to refer, related to the changes which the extracts made from different parts of the plants underwent after being kept for some time. It appeared from the experiments referred to by Mr. Squire in his paper, and the results of which were then on the table before the meeting, that an extract made from belladonna leaves alone, became mouldy in a few days after it was made; while the extract made from the flowers, fruit, and small stems of the same plant, kept well without change. These extracts were described as having been made by a process in which the albumen was separated and rejected, and the chlorophyll retained in the extract. That either extract so prepared should become mouldy was a result that he (Dr. R.) was not prepared to hear from Mr. Squire. All he could say was, that if the result occurred as stated, he was sorry for it. It proved that the process which had been adopted for separating the albumen and leaving the chlorophyll in the extract, was not so efficacious as a means of preventing the moulding of extracts as it had been represented to be. This process was one which Mr. Squire had been a strong advocate for, and if in his hands it failed, what could be expected from it in the hands of less careful operators? The fact was, that in the process referred to, the albumen was never wholly removed, and without much care sufficient albumen would be retained in the chlorophyll to cause the extract to become mouldy. He (Dr. R.) had never been fully convinced of the efficacy of this process for ensuring the object contemplated, and was inclined to favour the process which most modern European and American pharmacopœias had adopted, in which both chlorophyll and albumen were removed from the extract. The separation of the albumen could in this process be completely effected, and extracts could be obtained by it from the active and highly elaborated juices of the leaves of medicinal plants, which were more permanent and more uniform in

strength than those made in any other way. These extracts did not become mouldy, even if kept for several years, as he had repeatedly proved with some of the extracts, such as belladonna and hemlock, which were most subject to become mouldy when the albumen and chlorophyll were left in.

The PRESIDENT, in reply to the observations of the previous speaker, acknowledged the compliment paid him for what he had contributed on the subject of extracts; a subject which had certainly occupied his attention for many years. He had felt anxious that the processes to be given in the forthcoming Pharmacopœia should be of such a practical nature as to be adopted without hesitation by manufacturers, and he had therefore freely given the results of his experience, with the view of promoting that object. He could not conceive how any one could misunderstand what had been stated, as any one reading his paper must see that the extract marked A was made from the small stems, flowers, and fruit: in fact, it was made from those parts of the plant which he (Mr. Squire) thought ought to be used in addition to the leaves, but which, according to the directions of the Pharmacopœia, were to be rejected. What he had been principally anxious to contend for was that there were other parts of the plant besides the leaves that yielded a good extract, and that these parts in fact yielded a better extract than that obtained from the leaves alone. These other parts were ordered to be used by most of the recent Continental pharmacopœias, and he hoped they would also be ordered in the British Pharmacopœia. With regard to what had been stated respecting the different processes for the preparation of extracts from green plants, he confessed that he was in favour of retaining the chlorophyll, as it gave a character to the extracts which served to distinguish them from others. He approved of the separation and rejection of the albumen, as the presence of this in the coagulated state was the principal cause of mouldiness in these extracts; and he was ready to admit, as stated by Professor Redwood, that the imperfect separation of the albumen was the cause of the extract he had prepared from belladonna leaves having become mouldy. He did not consider however that this result in that particular instance proved that the process would not be effectual under other circumstances, such as he had indicated. In fact, the three samples of extract on the table had all been prepared by precisely the same process, and in only one of them had mouldiness appeared.

Mr. SAMUEL GALE said he must acknowledge that until that evening he had been under the impression that the extract of belladonna that had been referred to as Extract A, was made from the stalks alone. This was the impression made upon his mind after reading the paper, for he had not had the benefit of being present at the previous meeting. He could fully confirm what had been stated at the previous meeting with reference to the effect of evaporating the juice at a temperature below that at which coagulation of the albumen takes place. In their laboratory (Messrs. Bell and Co.'s) they always adopted that method of preparing the extracts from green plants, evaporating the juices in shallow pans, heated with water, and *not with steam*, to a temperature not exceeding 120° Fahr. Extracts thus prepared, even when made from the leaves, kept perfectly well for years, without becoming mouldy.

Mr. DANIEL HANBURY inferred from what had been stated, that although there was no evidence to show that extract made from the juice of the stalks was as good as that made from the leaves, yet that the small stems, together with the flowers and fruit, yielded a better extract than the leaves; hence it would appear that the small stems, flowers, and fruit might be used for making extract, and the leaves applied for other purposes.

Mr. MEE referred to the peculiar circumstances under which the extracts of belladonna, that formed the subject of Mr. Squire's paper, had been pre-

pared, the plants having been collected in the latter end of September. In his botanical studies he had been taught that the sap of plants ascends the stem, and passing into the leaves, is there elaborated, and the active secretions of the plant produced, some part of which again descends at a subsequent period through the bark. Now, as the plants used by Mr. Squire were collected at a very late period of the season, may they not have contained an unusually large proportion of active matter in the juice of the stalks arising from the peculiarity of the season, and the period at which they were collected?

Professor BENTLEY, in reply to the previous speaker, said that no doubt the proportion of the active constituents of plants to be found in their stems varied according to the nature, season, and period of growth of the plants; but, as a general rule, he felt satisfied that in preparing extracts from *herbaceous* plants, it was the best plan to take the young soft parts with the leaves.

Mr. CUTTING, of Selby, wished as a country member to express the gratification he had felt in being present to hear the discussion of this subject. He could not say that he had been left in any doubt, after reading the valuable paper of the President, as to the purport of the experiments referred to, or the observations made upon them. He had interpreted some parts of the paper, which, taken alone, might have left him in doubt, by referring to other parts which cleared up the doubt, and he came to the conclusion, that what was intended was to show, not certainly that the stalks *alone* of belladonna might with advantage be used for making extract, but that the young and soft stalks, flowers and fruit, taken together, made a better extract than that made from the leaves alone.

He wished further to express his strong and long-cherished conviction that the papers and discussions which thus came from month to month before the Society, were productive of much good, and that the young men who were enabled to attend them, might congratulate themselves upon the privilege they thus enjoyed. He hoped these young men would not only derive all the advantage they could from attendance at the meetings, and from studying in the school of the Society, but that they would afford evidence in after life of the benefits which a continued connection with the Society was sure to confer upon them, and that they would do their utmost to induce others to partake of the same benefits, so that the enlarged premises, with the many admirable facilities for study, provided by the Socicty, might be thronged with a constant succession of students, eager to improve themselves in the knowledge of Chemistry, Pharmacy, and Botany; and thereby aid the Council and the friends of the institution to raise it to that position in the estimation of the public which he believed it was destined to reach at some future period.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The second meeting of the Thirteenth Session was held at the Royal Institution on Thursday, October 31st,

THE PRESIDENT IN THE CHAIR.

The minutes of the last meeting having been read, Mr. W. BARTON and Mr. H. HARDING were elected Members.

The SECRETARY announced the donation to the Library of three numbers of the 'New York Journal of Materia Medica,' from Messrs. Morgan, Brothers.

Mr. H. Bird introduced to the notice of the meeting a new invention of his own for preventing accidental poisoning from the administration internally of external applications, or other deleterious substances. This invention consists of a cork with a metallic, ivory, or wooden top, having sharp projecting points, and the word "Poison" painted or engraved on the top: the exclusive use of these corks for bottles containing any dangerous substances, would effectually prevent the *accidental* administration of poison; as the party taking up the wrong bottle would, on attempting to remove the cork, at once find out his mistake; or even if he were not aware of the meaning attached to the use of such a cork, its peculiar shape and unpleasant feel would lead him to examine it more closely, and the word "Poison" on the top would point out that he had not taken up the bottle required.

The President approved of the invention, and made some remarks on the general subject of accidental poisoning, and the best means for its prevention. The Secretary pointed out that, in order to secure the full advantage of Mr. Bird's contrivance, it would be requisite to have the cork permanently attached to the bottle containing the poison; otherwise it might be lost, or used for another bottle, and an ordinary cork substituted.

Dr. J. B. Nevins then delivered a lecture "On the Cause and Prevention of Smoke in Stationary and Locomotive Furnaces." The lecture was illustrated by a variety of diagrams and experiments; and on its conclusion a discussion took place, in which the President, Messrs. C. W. Williams, T. R. Arnott, N. Mercer, and Dr. Nevins took part. The proceedings were brought to a close by a vote of thanks to the Lecturer.

The third meeting of the Thirteenth Session was held on Thursday, November 14th,

THE PRESIDENT IN THE CHAIR.

After the minutes of last meeting had been read, the following gentlemen were elected Members of the Association:—Dr. T. R. Mitchell, Messrs. W. F. G. Benson, T. Johnson, J. C. Sellars, and A. C. Wootton.

The Secretary acknowledged the following donations to the Library:—'The Technologist' for November, from the Editor; 'Proceedings of the Philomathic Society,' from the Society; 'Address of the President of the Philomathic Society, on Opening the Thirty-seventh Session,' from the Society; two papers from Professor Bentley, one 'On the Advantages of the Study of Botany to the Student of Medicine,' and the other, 'A Sketch of the Studies of the Medical Student;' a pamphlet from Messrs. Savory and Moore, 'On Poisons, and the Best Means of Preventing Accidents.'

Mr. Flowerdew exhibited an improved apparatus for the preparation of tinctures, etc., by percolation.

Mr. A. Redford drew the attention of the meeting to the variable purity of bromide of potassium, and pointed out the great difference in appearance of the same medicine dispensed at different places, where various samples of the bromide were used. Mr. Redford then proceeded to read a paper "On the Prevention of Poisoning by Accident." Mr. Redford, having reviewed the causes of accidental poisoning, and alluded to the various plans suggested for its prevention, described and exhibited the various narrow-necked bottles patented by Messrs. Savory and Moore, of which he spoke in high terms, as the most certain means yet brought into notice for securing public safety from poisoning by mistake.

After the conclusion of Mr. Redford's paper, a short discussion took place on the subject he had treated of; some members thinking that it would be quite impossible to secure the general adoption of any plan yet proposed, and that unless some simple method was brought forward, which would be likely to come into general use, the danger arising from the partial adoption of different plans for the prevention of mistakes, would be increased instead of diminished.

Mr. J. Abraham was of opinion that there were many difficulties in the way, which would prevent the general, or even extensive, use of the contracted-neck bottles for poisonous substances. He suggested that the insertion of a cork inside any bottle containing outward applications, or other poisonous liquids, would answer the purpose intended; its extreme simplicity, and applicability to bottles of any size or shape,

being strong recommendations in favour of this method for preventing the accidental administration of poison.

A vote of thanks having been passed to Mr. Redford and the various donors, the meeting separated.

The fourth meeting of the Thirteenth Session was held on Thursday evening, November 28th,

THE PRESIDENT IN THE CHAIR.

The minutes of last meeting were read.

The following gentlemen having been duly proposed and seconded, were unanimously elected Members of the Association :—Messrs. T. B. Steckles, Charles Owen, C. Troughton, C. Long, and C. Fothergill.

The Secretary having announced various donations to the Library and Museum, the President informed the meeting that the Council had decided on holding another Conversazione. The date fixed was the 20th of December; and he hoped that Members and their friends would be gratified by the result of the endeavours made to provide an entertainment of a scientific, and yet, at the same time, agreeably social character.

Mr. F. Kirkman described and exhibited in operation Professor Wheatstone's Private Telegraph Apparatus.

Mr. S. Banner read a paper "On Pill Coverings, and on the Preparation of a New Form of Medicine, Granular Powders." After drawing attention to the various coverings for pills generally adopted, those of Mr. Furley, of Edinburgh, and Messrs. Rouse and Co., of London, were noticed. Mr. Furley's covering is tragacanth, applied in the state of powder, the pills having previously been moistened with albumen, in the form of white of egg; the process is patented, or provisionally patented: the patentee charges a guinea for a perpetual license.* Messrs. Rouse and Co.'s method is apparently the same as noticed in the 'Pharmaceutical Journal' some time ago; that is, the pills are moistened with a solution of balsam of tolu, in spirit, and thrown about in a mortar or bowl with a fork or spatula, until the spirit has evaporated. Messrs. Rouse and Co. want 7*s.* 6*d.* for instructions, apparatus, and materials. Mr. Banner states that both these coverings are much inferior to the following :—Moisten the pills with a solution of tolu, one part of the balsam to two and a half of spirit, then throw into a tray containing powdered gum tragacanth, shake the tray for an instant, and the process is completed. Mucilage of gum acacia may be used instead of solution of tolu, care being taken that the pills are only just damped, as otherwise the covering of tragacanth becomes too thick, and cracks in drying. Pills covered in this way are not perceptibly increased in size, the film of tragacanth being so thin as to be semitransparent; nevertheless an assafœtida pill so covered may be kept in the mouth from one to two minutes without any flavour being perceived, excepting the agreeable one of the tolu. One gross of pills will require about ½ a drachm of solution of tolu, perhaps the same of tragacanth, can be coated in less than a minute, are ready for immediate use, and will not cost a halfpenny; if when the pills are taken out of the tragacanth they are shaken for an instant in a tray containg finely-powdered French chalk, a beautiful pearly appearance is imparted.

Mr. Banner next drew attention to Granular Powders as a form of medicine, by which charcoal, Gregory's powder, rhubarb, calomel, trisnitrate and carbonate of bismuth, etc., could be taken, without the taste being perceived, and without loss. The powder to be granulated is to be made with mucilage into a mass of peculiar consistency,—a mass that will with difficulty hold together, and very readily crumble,—a consistence well known to the dispenser. This mass may be granulated by either of the following methods :—rub it through a wire sieve twelve meshes to the inch, and sift into sizes, the fine powder being redamped, and the process repeated; or, having the mass a little damper than for the last, roll it into thin cakes, dry by a water-bath, rub into coarse powder, and sift into sizes, the fine powder being redamped as before. Granules made

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* The process of Mr. Furley was described in the last number of the Journal.

by the first method required to be dried; this may be effected by exposing them to the air in a warm place, or by shaking them about in a brass pan, over a gas-stove, for a short time; when dry, they are placed in a mortar, or bowl, with sufficient solution of tolu (1 to 2½) to moisten them, and beaten or thrown about until the spirit evaporates; when exhibited, the required dose, if small, is placed on the tongue, and washed down with a little water; when large, it is stirred into half a wineglassful of water, and swallowed, washing any stray granules down with a little more water, if necessary: this method renders powders, hitherto the most disagreeable of all forms of medicine, the most pleasant and easy. Dr. Skinner originally called his (Mr. B.'s) attention to the granular powders as used in France. No process was given in any French work he had seen, though one or two stated that the medicine in powder was the nucleus, having a coating of sugar.

Before the close of the meeting Mr. N. Mercer made a few remarks on the state of Pharmacy in France, and detailed some interesting particulars of his recent visit to Paris.

ORIGINAL AND EXTRACTED ARTICLES.

ON THE PREPARATION OF EXTRACTS.

BY MR. THOMAS B. GROVES.

I am inclined to believe that some at least of the views expressed by our President in a paper before the meeting of November 6, 1861, will, notwithstanding the high authority of their author, be received by Pharmaceutists generally with diffidence, if not entire discredit.

For one, I am not disposed to admit that wholesale druggists either invariably or as a general rule employ the process "which gives the best result in the most direct manner," unless indeed by the "best result" is to be understood the best in a commercial sense.

Nevertheless their experience is doubtless of great value to us on many points, though the preparation of "eclectic" medicines may not be one of them.

I am not a large manufacturer, but a very small one, and my experience is limited to a few plants that grow in my neighbourhood, being too far from Covent Garden to avail myself of its treasures without risk of their loss or deterioration.

The plant I have more especially worked is the *Hyoscyamus niger* which is most years obtainable in considerable quantity and great perfection from the rocky soils in the vicinity of the sea, or from the sea-cliffs themselves. I have it gathered when in full flower, and so soon as possible after strip the leaves and tender summits of the stalks from it, bruise them in a marble mortar, adding a little water should the mass not be sufficiently pulpy, express and evaporate by steam bath, without further treatment of any kind. The extract of Henbane so prepared, I have never observed show a symptom of mouldiness, and have frequently kept it without extra precaution for two or three years, though the extract of *Conium* made in the same manner keeps badly.

Its narcotic smell and bitter taste are very striking; indeed, so much do I prefer it to any I can buy, that I always make so much as I can, to be on the safe side in case of an accidental dearth of the plant.

I have always attributed the comparative inferiority of the purchased

extracts to two causes: first, the use of the whole plant instead of the leaf only; second, the plant being cultivated instead of wild.

The first cause was not assigned without consideration, aided by experiment.

I judged that the juices of a young herbaceous plant were *not likely* to be similar in every part of it (thus differing from a gentleman who spoke on this subject at the meeting), but that the juice of the stem and branches would in all probability mainly consist of a watery solution of the inorganic food of the plant on its way to the leaves for elaboration and fixation, and of gummy, albuminous, and other inert matters contained in the stem; that as the plant grew older and commenced forming its seed, a portion of such elaborated food would proceed in that direction, and be found *in transitu* in the softer part of the stem above the leaves. In the case of plants which form fleshy roots, tubers, etc., the course of the sap would be also diverted downwards through the stem, in all cases carrying with it the active principles of the plant, where such active principles are found in the fruit, or root, or both. Only in those cases therefore where the active principles of the plant are eventually more or less completely collected in the root, should I be prepared to find the juice of the stem rival in activity that of the leaves.

Hyoscyamus niger is not one of those cases. I therefore made the experiment of treating in a precisely similar manner, equal portions, twenty ounces, of rejected stems, and of leaves and tops such as I always employ for extract. I may here state that probably I reject on an average two-fifths of the plant; the individual proportions however are very wide of the average.

The stems yielded $5\frac{1}{2}$ dr. of a pale green extract, very saline in taste, and less bitter and odorous than the $9\frac{1}{2}$ dr. of dark extract I obtained from the leaves. The pale green extract was so evidently inferior that the physiological test was not resorted to.

The mixture of the poor and saline extract of the stem with the rich and characteristic extract of the leaves, in my opinion accounted for much of the inferiority of purchased specimens. I therefore put by specimens of both extracts and of their mixture, for the purpose of illustrating a paper I intended sending to the Society; but, having first prudently consulted the old Journals, to see whether the same results had been announced before, I there found, in the first volume, a paper by Mr. Squire, which completely took from me all claim to originality: so I desisted from my intention.

The views there expressed are so diametrically opposed to those of the more recent contribution, that I wonder reference was not made by the author of both, or by the meeting, to the fact. I quote the following from page 97, Vol. I. 'Pharmaceutical Journal:'—"The different parts of the plant which should be selected, is a subject of great importance. The College directs the leaves of those which are principally adverted to, and I think very properly. I have placed on the table for comparison, juice from the stalks of *Hyoscyamus* and juice from the leaves of *Hyoscyamus*, also two portions of extract resulting from equal bulks of juice; the one from the stalks, the other from the leaves. The sensible properties of these preparations will enable the Society to distinguish their wide difference."

The question, it must be remembered, is not merely which process yields the better, but also *which the stronger*, extract; and whilst I am quite willing to admit that the gummy and saline extract of the stem would greatly aid the keeping qualities of the extract of the leaves, I must dissent from the opinion that it is stronger, until more conclusive experiments have made the point certain, and indicated in each case the limit within which the use of the stem must be confined. To improve their consistence, and thereby aid their keeping, the addition of gum is recommended by Gray, and I have long

suspected the use of salt for the same purpose by modern manufacturers. The single experiment on which is founded a change of opinion as to the relative strength of the two extracts, must in candour be admitted to be a highly inconclusive one. But one species of plant was tested, and that gathered at an exceptional time, and in a most unusual condition, as is evidenced by its enormous yield of extract; fully three times the ordinary yield.

Again, knowing the extreme sensibility of the eye to the action of Belladonna, we should hesitate to receive any statement as to relative strength of specimens by means of that organ, before knowing the exact mode in which the results were obtained. The best plan appears to me to be this:—gradually dilute each specimen until it ceases to have any dilating effect, and then see which has borne dilution best.

Finally, the new view runs counter to very old opinions expressed and acted on by writers and the general public in all ages, that the dark livid-green of certain plants points to their poisonous properties; an opinion expressed by Pereira, who refers to the "dark lurid aspect of the Belladonna plant, as indicative of its deadly narcotic quality."

The lateness of this communication is accounted for by the arrangement that calls the monthly meetings on the first Wednesday in the month, instead of the latest possible day that would admit of the report being published in the next Journal. It now not unfrequently happens that the second meeting is over before the country chemist has had time to read the report of the first; almost always before he could prepare himself to treat a subject of any difficulty or demanding experiment.

Weymouth, December 17, 1861.

MEDICINAL EXTRACTS FROM THE FRESH PLANTS.

BY MR. G. B. FRANCIS.

Referring to the minutes of the meeting held November 6th, and published in this month's Journal, I find the remarks made by Mr. Francis on the preparation of extracts have been attributed to me by many who, like myself, were unable to be present on that occasion. As I totally dissent from the plan adopted by my friend and namesake on this particular, it may not be considered out of place if I explain my own.

At the outset, I protest against all reduction by boiling of vegetable juices for pharmaceutical purposes, for the nearest approach to a perfect extract I believe to be obtained by, in the first place, receiving the plant in as fresh a state as possible, and then without delay to express the juice, and reduce it at a temperature at which no change is perceptible. If the chlorophyll should become separated, and the albumen coagulated, the resulting extract will have altered in character, and be more likely to spoil by keeping. I am well aware that commercially, where large quantities of the herb have to be operated upon, this process is impracticable with our present appliances; and in that case experience proves that much greater injury results from subjecting the juice for a lengthened period to an extremely low temperature, than by using moderate heat, and bringing it to the required consistence as quickly as possible, exercising due precaution towards the close of the process.

I have always used the soft parts of the plants (*i.e.* the flowering tops and juicy shoots), as well as the leaves, presuming that if the framers of the Pharmacopœia were also makers of extracts commercially, they would do the same; for they must necessarily be convinced, by observation, that otherwise

they would reject that which is essential both to a good extract and a remunerative product.

I take the Pharmacopœia as my text-book, but at the same time act on the license it appears to offer,* if by any other process I can bring about a more satisfactory result. The more complete the exhaustion of the plant, the better is the quality of the extract, as well as rendering it more profitable. The great desiderata therefore appear to be an improved method for extracting the juice, and afterwards reducing it rapidly at a low temperature. I have tried a variety of experiments, but at present cannot report a perfect method either for exhaustion or evaporation. I shall however try again, and if others also will work to the same end, and we can put our results together, I do not despair of eventually overcoming these difficulties.

Perhaps our worthy President could furnish a few hints on this practical inquiry.

I make the average yield of 1 cwt. of Belladonna to be about 2½lbs., but my impression is that it should be much larger; and I arrive at this conclusion after a careful operation on dandelion root, and which I presume would apply equally to other substances that have to be treated in the fresh state.

A hundredweight of root, crushed and pressed in the ordinary way, yielded me 2 gallons of juice. The root now in the usual course would have been thrown aside as exhausted, but having my doubts, I determined on seeing it done thoroughly, and by further crushing and expression, several times repeated, I obtained an additional product of 4 gallons, and the quality of the last was quite equal to the first 2 gallons; it was more fluid, bright, and decidedly more bitter.

11, *Old Fish Street, E.C., December 4th*, 1861.

ON THE ADULTERATION OF TIN FOIL.

BY MR. J. H. BALDOCK.

Having occasion a short time back to prepare some compounds of tin, I employed for the purpose, in the absence of granulated metal, some tin foil, and was surprised to find my product very largely contaminated with some other metal. Upon careful examination of the tin foil which I had used, I found it to contain a large amount of lead. Believing that the presence of this metal in such considerable quantity in the foil is not generally known and recognized, I obtained a number of specimens of commercial foil and submitted them to analysis. Some of these were kindly supplied to me by Mr. Haselden, of Conduit Street, the remainder being collected by myself. They consisted of —1. Ordinary commercial foil; 2. Embossed foil; 3. Tinned paper; and 4. Foil lining the packets of Horniman's tea; together with a sample of 'Pure Tin Foil' from Mr. Saddington's, and some of Betts' Patent Capsules. The following table of the results of the analysis in the several cases will show the proportion of lead and tin present in the different samples. The processes employed will be subsequently described.

	1	2	4	Pure Foil.	Betts' Capsules.
Lead	86·93	76·57	88·665	34·375	84·56
Tin	13·06	23·42	11·345	65·625	15·46
	99·99	99·99	100·000	100·000	100·02

* There is no such license given in the Pharmacopœia.—Ed.

It thus appears that tin foil is such only in name, though the reason of this large admixture of lead is not very apparent, because the so-called pure foil noticed above, which contains a much smaller proportion of lead, appears to be in every respect better suited to general requirements, being at once thinner, lighter, and tougher. The only cause that I can assign is, that the alloy may be more easily rolled than the pure metal. I may remark that the sp. gr. of the alloy is less than would be indicated by calculation from the sp. gr. of the two metals. In Gmelin's Work a table is given, showing the actual and calculated specific gravities of these two metals when alloyed in different proportions.

Not long since there was a great deal said respecting the packing of tea, tobacco, snuff, etc., in *lead* foil, as in several instances accidents had occurred, owing, as it was then shown, to the formation of a subcarbonate of lead, which was disseminated through the contents of the packet; and, if I recollect rightly, it was suggested that *tin* foil should be substituted for that made from lead. If it is true, however, that tin foil is itself so extensively adulterated with lead, it is obvious that no advantage would be gained. On the contrary, such an alloy is more easily acted upon than either of its components would be alone. Some time back I noticed on some foil, which had been in contact for some time with a packet of acid papers for Seidlitz powders, evidence of corrosion or chemical action, and the presence of lead was shown by the resulting compound blackening in the presence of HS.

For simply detecting the presence of the lead, I found the readiest method to consist in oxidizing the foil with nitric acid, and to dissolve out the nitrate of lead from the insoluble peroxide of tin with hot water. Crystals of the salt were generally deposited from the solution on standing. For the quantitative estimation of the two metals, I have tried several processes, with varied degrees of success.

First, dry chlorine gas was passed over the foil, heated in a bulb tube, when the volatile bichloride of tin distilled over, leaving the fixed chloride of lead in the bulb. This process was not however adopted, for two reasons; 1st, because some difficulty was experienced in condensing the whole of the distillate; 2ndly, and most important, that some of the foil at the termination of the process fused and escaped the action of the gas.

Secondly, the foil was treated with nitric acid, sp. gr. 1·37, whereby the tin became converted into the insoluble binoxide, and the lead into nitrate; the latter was dissolved out by water, the lead precipitated as sulphate, which was washed, dried, and calcined, and from which was calculated the amount of the metallic lead; the binoxide of tin was also washed, dried, and calcined, and the amount of metallic tin calculated from it; this process is simple, expeditious, and appears to give very good results.

Thirdly, the foil was treated with nitric acid, and evaporated nearly to dryness, with a small excess of sulphuric acid, whereby the two metals were converted into sulphates; the nearly dry residue was then washed with water, and digested repeatedly with solution of acetate of ammonia of sp. gr. 1·06 or above, which dissolved out the whole of the sulphate of lead. Sulphide of ammonium was added to the solution, and the precipitated sulphide of lead washed, and reconverted into sulphate by heating with a mixture of nitric and sulphuric acids, and from this the metallic lead was calculated as before: the sulphate of tin was then calcined to convert it into binoxide, from which the metallic tin was calculated. There appears to be no objection to this process, except that it is rather long, as it gives very good and accurate results; it has, moreover, the merit of simplicity. The annexed table gives at A the results of the second process upon sample No. 1; and at B the results of the third process upon the same sample:—

	A.		B.
Lead	85·52	Lead	84·84
Tin	14·12	Tin	15·06
	99·64		99·90

Both these, it will be observed, estimate the lead a little too low, arising from insufficiency of washing, some time being required to complete that part of the process.

The process, however, which I found to give me by far the best results, and to be the most convenient in execution, is one described by Rosé. It consists in fusing the alloy with an excess of a mixture of sulphur and carbonate of soda. The metals combine with the sulphur to form sulphides, while at the same time the sulphur and carbonate of soda react to form sulphide of sodium. The sulphide of tin combines with the alkaline sulphide, forming a soluble compound, while the sulphide of lead remains unaffected. The fused mass is digested with water, and filtered. The insoluble sulphide of lead is washed, dried, and calcined with a mixture of nitric and sulphuric acids, whereby it is converted into sulphate, from which the lead is calculated as in the previous cases; to the filtrate excess of hydrochloric acid is added, which decomposes the sulphur compounds, and precipitates sulphur and the sulphide of tin; the precipitate is washed, dried, treated with nitric acid, and calcined, when binoxide of tin results, from which the metal is calculated.

55, *St. James's Road, Holloway.*

CASELLA'S THERMOMETER.

TO THE EDITORS OF THE PHARMACEUTICAL JOURNAL.

Gentlemen,—Through the kindness and courtesy of Mr. Attfield, I have been enabled to examine with him some of Casella's thermometers, and I feel it my duty to state that Mr. Casella has succeeded in solving the problem, and so to balance the forces of cohesion and gravity as to make a reliable instrument. I may be allowed to add that before writing my former letter, I not only tried many experiments with several tubes, but the exigency of my objection was acknowledged by a gentleman who, if I felt justified in mentioning his name, would be allowed to be second to none as an authority on the subject. Moreover, in our first experiments in the laboratory at St. Bartholomew's Hospital, Mr. Attfield will corroborate me in stating that Casella's own tubes behaved in the manner I stated, when the thermometers were flat on the table, and it was only when hanging up that they acted properly; so nearly balanced and delicate is the point as to whether any tube of such a construction will be successful or not. In my experiments I used the tubes only, without mounting them. I can only think that if other parties, brought into apparent collision on scientific points, such as ozone, etc., had adopted the course followed by Mr. Attfield, and had personal intercourse and experiments in common, much waste of time and shyness, if no worse feeling, might have been spared, and no doubt science have been the gainer.

Yours truly,

W. SYMONS.

17, *St. Mark's Crescent*, 14*th December*, 1861.

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATIONS,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

Comparative Changes of Temperature in the Air and in the Earth.—M. A. Pousiau has communicated to the French Academy the results of some very interesting and highly valuable experiments, which he has conducted during five consecutive years, on the relative changes of temperature which take place in the air and in the earth at a depth of two mètres. The following tables exhibit these results:—

COMPARISON BETWEEN THE ANNUAL MEAN TEMPERATURE OF THE AIR AND THE EARTH RESPECTIVELY.

	The air (9 a.m.).	The earth (2 mètres).	Differences.
1856.....	9·74° C.	12·42° C.	2·68° C.
1857.....	10·57	12·64	2·07
1858.....	10·09	12·74	2·68
1859.....	11·37	13·83	2·46
1860.....	9·30	12·29	2·99
Mean of the five	10·21	12·79	2·58

MEAN TEMPERATURES OF THE SEASONS COMPARED.

	Air.	Earth.	Differences.
Winter.....	1·40° C.	8·76° C.	+7·36° C.
Spring	9·72	9·67	−0·05
Summer	19·55	17·28	−2·27
Autumn	10·35	16·29	+5·94

THE MAXIMUM TEMPERATURES OF EACH YEAR COMPARED.

	Air.		Earth.		Differences.
1856.....	34·8° C.	(13th Aug.)	19·30° C.	(26th Aug.)	15·50° C.
1857.....	35·3	(20th Aug.)	?		?
1858.....	34·7	(16th June)	18·64	(24th Aug.)	16·06
1859.....	35·9	(8th Aug.)	22·05	(25th Aug.)	13·85
1860.....	31·9	(16th July)	19·00	(End of Aug.)	12·90
Means.....	34·5		19·75		14·58

THE MINIMUM TEMPERATURES OF EACH YEAR COMPARED.

	Air.		Earth.		Differences.
1856.....	−11·3° C.	(14th and 20th Dec.)	?		?
1857.....	−11·1	(3rd Dec.)	5·47° C.	(3rd Mar.)	16·57° C.
1858.....	−10·1	(29 Jan.)	6·19	(6th Feb.).	16·29
1859.....	− 8·2	(11th Jan.)	6·60	(5th Feb.)	14·80
1860.....	−20·0	(20th Dec.)	5·79	(1st Mar.)	25·79
Means.....	12·14		6·01		18·36

	Air.	Earth.	Differences.
Means of extreme maxima.....	34·50° C.	19·75° C.	,,
Means of extreme minima.....	−12·14	6·01	,,
Total differences.....	46·64	13·74	32·9° C.

The following are the conclusions which the author deduces from these observations:

1st. That the mean temperature of the air (for the five years) having been 10·21°C., that of the earth was 12·79°, giving a difference in favour of the earth of 2·68°.

2nd. That the mean temperature of the earth is higher than that of the air in winter and autumn; that it is lower by about 2° in summer, and that in spring the mean temperatures of the earth and air are about equal.

3rd. That in the air the mean of the extreme maxima was 34·5°, while in the earth it was only 19·75°, giving a difference for the air of 14·58°. On the other hand, the mean of the extreme minima having been −12·14, in the earth this mean only reached +6°.

4th. That while in the air the mean of the total differences between the extreme maxima and minima is as great as 46·64, in the earth this mean is only 13·74, which corresponds to 32·9° difference on the part of the air.

5th. That although the temperature of the air fell to −20°, as in 1860, the minimum reached by the earth was only +5·47.

6th. That while in the air the maximum temperature is generally obtained in July or August, and the minimum in December or January, in the earth the maximum always corresponds to the end of August, and the minimum in February or the first days of March.

7th. That the change or alteration of temperature in the earth at 2 mètres deep may be stated as follows:—

While the *mean* temperature of the air commences to fall towards the end of July; in the earth, on the contrary, the heat continues to accumulate in the upper layers under the influence of the intense solar radiation, and passes down into the inferior layers until the end of August. About this period the surface layers commence to lose more by radiation than they receive, and the flow of the heat is therefore changed in its direction. The caloric is transmitted from below upwards and is lost in the air. This ascensional movement continues until February, and is more rapid as the external temperature is lower.

Lastly, towards the middle of February or the commencement of March, the upper layers begin again to receive heat from the solar rays, and less and less passes up from below, until the contrary action commences, and heat passes down until the end of August.

On Chlorsulphuric Acid.—M. A. Rosenstiehl has been engaged in studying the action of anhydrous sulphuric acid on common salt, and has succeeded in obtaining a body possessing considerable interest. He was led to examine this reaction through an unsuccessful attempt to prepare chloromanganic acid by Wöhler's process for chlorochromic acid. Sulphuric anhydride and chloride of sodium are the chloruretting agents used by Wöhler; M. Rosenstiehl conceived that these bodies reacting would produce the SO_2Cl of Regnault, and that it was this body acting on the chromate which produced the CrO_2Cl. Experiment showed, however, that he did not sufficiently consider the bibasic properties of sulphuric acid.

The anhydrous sulphuric acid was produced by the distillation of Nordhausen acid. A retort surrounded by ice was employed as a receiver. When the retort was sufficiently full, some recently fused chloride of sodium reduced to powder was thrown in, and sufficient heat applied to fuse the anhydrous acid. If a trace of hydrated acid was present, sufficient heat was produced on admixture to effect the fusion even better than with artificial heat. The first reaction having calmed, the mixture was distilled, sufficient heat being employed to maintain the residue in complete fusion. The distilled liquid was abundant; to free it from any traces of anhydrous sulphuric acid, it was rectified over some more fused salt. Thus purified it was submitted to analysis. A portion was weighed in a small bulb and decomposed by water in a tall éprouvette, to prevent loss from projection. The sulphuric acid and chlorine was then estimated by the usual methods in the liquid. The results indicated the formula S_2O_5Cl, as will be seen by the following numbers:—

	Found.	Calculated.
Sulphur.....	29·80	29·77
Chlorine.....	33·27	32·92

The vapour density also confirms this formula:—

Found.	Calculated for four volumes.
3·7	3·712

The following equation represents the reaction which had occurred:—

$$NaCl + 2S_2O_6 = NaO,S_2O_6 + S_2O_5Cl.$$

To prove that the residue from the distillation really consisted of bisulphate of soda, it was recrystallized to free it from any remaining portion of common salt, and analyzed.

This equation furnishes another argument in favour of doubling the formula for sulphuric acid. The new compound then forms the first term of a series of chlorine compounds, of which two are known:—

Monochlor-sulphuric acid, S_2O_5Cl
Bichlor-sulphuric acid, $S_2O_5Cl_2$ (Regnault).

The monochlor-sulphuric acid is an oily colourless liquid, having a density of 1·762, and boiling between 145° and 150° C. It does not fume in the air so much as anhydrous sulphuric acid. Its odour resembles that of similar volatile chlorine compounds. Water decomposes it with violence. It energetically carbonizes organic substances. Poured upon a crystal of chromate or bichromate of potash, it immediately forms the chloride of chromyl:—

$$KO,CrO_3 + S_2O_5Cl = KO,S_2O_6 + CrO_2Cl.$$

With a manganate, chlorine alone is disengaged. It reacts in the cold upon anhydrous acetate of soda, and forms chloride of acetyl without any carbonization. These facts prove that it is a powerful chlorodizing agent, and as its preparation is easy, it may, in many cases, be substituted with advantage for oxychloride of phosphorus.

This monochlor-sulphuric acid is not a new body. Professor Rosé, in reacting with sulphuric anhydride on chloride of sulphur, obtained first an abundant disengagement of sulphurous acid, and subsequently a small quantity of an oily body boiling at 145°, and having a density of 1·81. He assigned to this body the composition $5SO_3 + SCl_3$, and rejected the formula now adopted by M. Rosenstiehl. Rosé's object was to prepare SCl_3, and he conceived this body might contain it combined with $5SO_3$.

ACTION OF WATER ON COMMERCIAL CHLORIDE OF LIME, AND REMARKS ON ITS CHEMICAL CONSTITUTION.

BY M. FRESENIUS.

It is generally admitted that chloride of lime is composed of a mixture of hypochlorite of lime, chloride of calcium, and hydrate of lime; or a combination of hypochlorite of lime with chloride of calcium, mixed with hydrate of lime. M. Millon, on the contrary, considers it to have the composition CaO,Cl. The author thought that the action of water on chloride of lime would throw some light on its constitution.

The chloride of lime employed for analysis was taken from a large sample of 250 kilogrammes. It yielded 26·52 p.c. of chlorine, and 13·25 p.c. of hypochlorous acid. To estimate the whole of the chlorine a weighed quantity was treated with water and ammonia, nitrate acid added, and the solution then neutralized by carbonate of soda The chlorides were then estimated in the liquid by nitrate of silver. By the volumetric process with bichromate of potash, 29·57 p.c. of chlorine was found.

The lime was precipitated by oxalate of ammonia. Two analyses yielded 46·35 p.c. and 46·40 p.c. Mean=46·37 p.c. From these numbers the following composition is calculated:—

CaO,ClO	26·72
CaCl	25·51
CaO	23·05
Water	24·72
	100·00

Which may be thus stated:—

CaO,ClO	26·72
CaCl (in combination with the above as CaO,ClO+CaCl)	20·72
CaCl in excess	4·79
CaO,HO	30·46
Water combined	17·31
	100·00

The author has verified this composition in the following manner:—

A weighed portion of chloride of lime was treated with a known volume of hydrochloric acid. The reaction was conducted in a flask furnished with a long glass tube to avoid loss of the acid. The difference in strength of the hydrochloric acid before and after the experiment showed the quantity of acid saturated by the lime. This was found to be equivalent to 57·206 of anhydrous acid for 100 of the chloride. This closely approximates the amount required by theory. The reaction is as follows:—

$$CaO,ClO + CaCl + 2HCl = 2CaCl + 2HO + 2Cl.$$

26·72 of hypochlorite and 20·72 of chloride of calcium being present in 100 parts of chloride of lime, there would be then 47·44 p.c. of chloride of lime, requiring 27·24 of hydrochloric acid, the 30·46 of hydrate of lime requiring also 30·01 of acid, making 57·25 together. Experiment gave 57·206.

The lime of the 4·79 of chloride of calcium, not having been saturated by the acid, would remain in excess.

50 grammes of chloride of lime were treated with ten successive gradually increasing portions of water. 80 grammes of water were employed for the first lixiviation; the mass being thrown on a filter, 20 grammes of filtrate were obtained; a second lixiviation yielded 30 grammes of solution, a third, 100; a fourth 120, etc. The results are shown in the table below.

These solutions were analyzed immediately after filtration to avoid as much as possible the action of the air. The chlorine and hypochlorous acid were estimated as before; the same estimations were also made in the deposit remaining after the tenth washing. The following numbers were obtained:—

Solution.	CaO,ClO	CaCl.	Atoms of CaCl for 1 atom of CaO,ClO.
1	4·5371	15·9437	4·5279
2	5·2254	7·6451	1·8851
3	3·6968	2·6064	0·9084
4	1·6004	0·9897	0·7968
5	0·4672	0·2971	0·8193
6	0·1600	0·1198	0·9647
7	0·0602	0·0487	1·0422
8	0·0128	...	...
9	0·0060	0·0067	1·4319
10	0·0039	0·0043	1·4521
Residue	0·1389	0·0321	0·2981

The following conclusions are drawn from these experiments.

1st. The first portion of water (80 grammes) dissolved all the chloride of calcium, as the last portions contained very little.

2nd. The hypochlorite of lime on the contrary entered gradually into solution.

3rd. At the end of the third lixiviation all the free chloride of calcium was dissolved; for from this time the proportion between the hypochlorite of lime and the chloride of calcium became nearly regular.

4th. As the chloride of calcium dissolves at once completely, while the hypochlorite dissolves principally after the third lixiviation, it results that either these two bodies are in combination, or that the water decomposes chloride of lime into hypochlorite and chloride of calcium.

5th. The author considers that the hydrate of lime is combined with the chloride

of calcium, forming a basic chloride. This would explain the reason why 4 atoms of hydrate of lime take 2 atoms only of chlorine. This opinion is supported by the fact that the crystalline compound $3CaO,CaCl + 16HO$ is decomposed by water into hydrate of lime and chloride of calcium.

6th. The author assigns to chloride of lime the following formula:—

$$CaO,ClO + CaCl,2CaO + 4HO.$$

7th. The hydrate of lime separated when the chloride of lime is treated with water, retains with great force a certain amount of hypochlorite which repeated washings will not remove. In estimating exactly the hypochlorous acid in chloride of lime, it is necessary therefore to value the deposit with the solution. For commercial purposes, however, it is better to assay the clear solution filtered from the deposit, as that alone is employed, the deposit being usually rejected.—*Répertoire de Chimie.*

A NEW LOCAL ANÆSTHETIC.

BY M. FOURNIÉ.

The author of this paper was induced to try the action of the mixed vapours of acetic acid and chloroform on his own person, in the hope of discovering a good local anæsthetic.

After a number of experiments on himself, on animals, and on other patients, he has arrived at the following satisfactory conclusions.

If in an apartment of which the temperature is above 17° (62° Fahr.), the orifice of a thin glass flask, about half-filled with a mixture of equal parts of glacial acetic acid and chloroform, be applied to a healthy skin not deprived of epidermis, and the flask be maintained at the temperature of the hand, a complete insensibility of the part may be attained in about five minutes, and with very slight pain.

The mixed vapours of acetic acid and chloroform may be employed for producing local anæsthesia in all minor operations in surgery which concern principally the skin, in some more important cases, and in nearly all those in which the ordinary general anæsthesia is contra-indicated, because the patient fears the danger of inhalation.

This method, which the author in his paper, read before the Académie des Sciences, calls chloracetization, he describes as the most certain, easy, and economic means of producing local anæsthesia yet introduced.—*Comptes Rendus.*

ON CERTAIN REACTIONS OF CINCHONINE.

BY M. HORACE KŒCHLIN.

A mixture of bichloride of mercury and cinchonine, when heated becomes first brown, and then violet-red. The mercury is reduced to the metallic state. This colour is not stable, its alcoholic solution passing to brown in a few days.

Cinchonine heated with tartaric acid gives off yellow and then violet vapours. A brown mass remains, dissolving in alcohol, to which a little acetic acid has been added, and forming a red solution. This colour passes to yellow by alkalies, and is restored by acids.

A red product is also obtained when cinchonine is heated with oxalic acid, phosphoric acid, or biniodide of mercury.

When a mixture of bichloride of carbon and cinchonine is heated in a glass retort, a red substance is obtained, and fine violet vapours, which condense in the neck of the retort. These two products are soluble in alcohol.

Iodide of amyl and iodide of ethyl, heated with cinchonine, also yield a violet-red colouring matter, accompanied by a brown resin difficult to separate from it. The red substance thus obtained is soluble in alohol, pyroxylic spirit, ether, and iodide of amyle. The alkalies of tannin precipitate it from solution. Dilute sulphuric, hydrochloric, and nitric acids are without action on it. Concentrated they dissolve it with a yellow colour.

The alcoholic solution of this colouring matter, diluted with water, dyes silk, wool, and cotton mordanted with tannin, of a violet-red.

It dyes cotton, mordanted with iron, grey; and cotton mordanted with alumina, brown.—*Répertoire de Chimie.*

POISONING FROM DISEASED GRAPES.

A case is reported in the 'Echo Médieal Suisse,' of a wet-nurse, twenty-two years of age, who, after partaking of some grapes which were infected with oidium, in a few hours suffered from severe gastralgia, great difficulty of breathing, vertigo, loss of memory, and delirium. She was restored to health by the administration of opiates internally, laxative injections, and the application of laudanum poultiees to the stomach. For some days, however, she remained in a very weak condition, and her infant was attacked with a very violent and obstinate diarrhœa. The Editor of the 'Répertoire de Pharmacie,' after narrating the above case, remarks that such grapes have been hitherto regarded as innocuous. This is the first instance, also, as far we know, of any injurious consequences having arisen from eating grapes infected with oidium.

ON THE STARCH OF UNRIPE OR GREEN FRUITS,

AND THE RELATIONS BETWEEN IT AND THE DEVELOPMENT OF MATURATION OF FRUITS.

BY M. PAYEN.

The most evident facts are often disregarded or subsequently controverted even by men of real talent. It is thus that science is encumbered by difficulties which it is very desirable and sometimes easy to dispel. I think I can present to the Academy of Sciences a very striking example.

In 1832, M. de Candolle, in his 'Physiologie Végétale,' vol. ii. p. 584, states, upon the authority of a distinguished chemist, that "we cannot with a solution of iodine find any trace of starch in aqueous fruits, nor even in pears and apples, although such a statement has been made." He then proceeds to give a comparative analysis of unripe and ripe fruits by detailing the respective proportions in them of water, sugar, tissue, gum, acids, etc.

I have discovered, however, abundant evidences of starch-granules in pears and apples before the period of maturation, and I cited this fact in 1849. (See first and following editions of 'Préeis de Chimie Industrielle.') Since then, in an unpublished memoir upon the maturation of fruits, by MM. Decaisne and Fremy, but which the 'Traité de Chimie Générale,' vol. iv., published in 1855 by MM. Pelouze and Fremy, contains an abstract, we find the following passage:—"When we find starch in very large quantities in certain unripe fruits disappear completely at the period of maturity, it is impossible not to admit that it is this body which, in a modified form . . . produces the glucose of fruits. . . . Some other neutral matters ought to undergo a similar modification." These conclusions were also admitted by a skilful experimentalist lately, in an interesting memoir, where he demonstrated the co-existence of cane-sugar and glueose in several fruits. But how remarkable was it, that whilst he pointed out the abundance of starch which existed in plants, "which makes us suppose that it is the true souree of the sugary matters of fruits," the author adds, "however, we cannot discover its presence in unripe fruits, either by the microscope or by a solution of iodine"! Apples and pears were among the unripe fruits with acid juices upon which experiments had been made. In banana-fruits alone, the juices of which were known to be neutral, experiments had proved the existence of an abundance of starch before the period of maturation; which starch was replaced by sugar in the ripe fruits.

The presence of amylaceous matter in acid fruits was thus again contested, and under circumstances in which this fact would have been favourable to the conclusions

of the author. In order that henceforth there may not be the least doubt raised on this point, I present to the Academy a most evident experimental demonstration, which is of a very simple nature, which allows of our following the different steps of the transformation, not only in distinct species or varieties of fruits, but also in different parts of the same fruit at all periods of its growth till the approach of maturation. The following is the mode of operating:—

A thin vertical slice of each fruit to be tested is taken and immediately plunged into water in order to avoid the action of the air upon the colourable matters it contains, and to remove all those soluble substances from the surface of the section which would absorb iodine. After this washing, a watery solution of iodine, slightly alcoholized, is substituted for the water, and the slices are left under the influence of this solution for one or two hours.

Specimens treated in this manner demonstrate in the most conclusive way the presence of a starch in apples, pears, and quinces which have attained to the quarter or half of their development, by presenting the blue or very deep violet colour which characterizes that substance under the action of iodine.

I have observed by the microscope the starch contained in the half-ripe fruit of the apple, and noticed that the granules were very numerous, and were often grouped together in masses of two or three together, and that each granule distinctly exhibited a hilum.

From two slices taken from nearly ripe pears, the starch-granules had completely disappeared from the part near to the stalk and from the greater portion of the whole pericarp; but their presence was manifested near the epidermis, especially towards the extremity of the fruit opposite to the stalk, and around the cells which enclosed the seeds. I propose to verify next year if this is a general law in the process of maturation; if in the tissues near to the surface the starch disappears sooner than in those parts of the pericarp which are more deeply seated and removed from the direct action of solar light.

Some similar observations, which were made upon the nearly ripe fruits of the quince-tree of Portugal, exhibited the above results in a more evident manner when the yellow colouring matter which is met with in large amount in such fruits had been previously removed by the action of alcohol. When this has been done, the slices should be dried, and then soaked completely in water. Even then, it is not until the slices are plunged into the watery solution of iodine that we may readily observe the last traces of starch remaining in this fruit.

In a communication which I made in 1849 to the Academy, and which is inserted in the twenty-second volume of our 'Memoirs,' may be found experimentally verified the fact of the production of amylaceous matter preceding the maximum development of sugar in the stalks and even in the leaves of young plants of the sugar-cane.

In conclusion, I should observe that however easy it may be to prove the presence and variations in amount of starch in vegetable cells, yet we must be careful, in order to avoid any error, to take into consideration the coloured or colouring substances which may hide the reaction; the nitrogenous matters which, by absorbing iodine, become of a more or less evident orange-yellow colour; and even the foreign matters which, according to the observations of M. Buignet, possess the same property. I will add, lastly, that, to avoid all chance of error, we must also be prepared against the effects of a special property of amylaceous matter itself, when it occurs in very small granules and but feebly clustering, namely that of spontaneously giving off the iodine to which its violet tinge is due. Such is the character of the starch from cocoa-seeds, which fact has been altogether unnoticed by skilful experimenters, although it exists in the proportion of ten per cent. in the kernels of the seed.

This special character of the normal starch of cocoa seeds greatly facilitates the discovery of those amylaceous substances, which are sometimes added in certain preparations of this alimentary substance; for these, under the same conditions, retain strongly, as a general rule, the blue tint produced by the action of iodine.—*Comptes Rendus de l'Académie des Sciences.*

MISCELLANEA.

Explosion of Paraffin.—On Monday night, December 2, an alarming explosion of oil, alleged to be "paraffin," occurred in the oil and Italian shop of Mr. Masters, opposite the Prince Albert tavern, Great College Street, Camden Town, causing the entire destruction of the premises, an extensive stock-in-trade, and serious injury to a man and boy, who narrowly escaped with their lives, together with considerable injury both by fire and water to the premises adjoining on either side. It appears that about seven o'clock a cask of oil, described as paraffin, was removed from a van in the street to a room behind the shop, for the purpose of being emptied into another cask, and while the carman and a boy were in the act of so doing, a candle held by the boy suddenly ignited the vapour of the oil, producing an instantaneous explosion, so violent as to break the casks and blow out a large window, the burning oil setting fire to the clothes of the man and boy, who ran into the street calling for assistance. The flames spread rapidly through the building. It was completely gutted, and the adjoining premises were more or less injured before the fire could be finally extinguished. One of the parish engines first arrived, but not until some time after the unfortunate occurrence. The injured man and boy were so much burnt that they had to be removed to the University College Hospital.—On Wednesday, December 11, an inquest was held before Mr. Humphreys, the coroner for East Middlesex, on the body of the boy, George Frederick Danser, aged eleven years, who died from the effects of injuries he had received from the explosion. It was stated that the man who was injured continued at the hospital in a very precarious state. The father of the deceased said that his son was brought home terribly burnt, on Monday night, December 2. Witness sent for Dr. Brown, who attended him, but he died on Friday, December 6. Mr. George Masters said that he had some paraffin oil on his premises, which he was about to return, as it was not good. He purchased it of Messrs. Wills and Co., of Whitechapel. Their carman was removing it when it exploded. Witness was then in the shop behind the counter, and was in the act of getting to the parlour, where the oil was being drawn off, when it exploded, and in another minute he must have been in the same room, and perhaps have shared a similar fate. He purchased the paraffin oil about three weeks before from Mr. Briand, the traveller to Messrs. Wills. He had previously asked if it was combustible or dangerous to keep in stock, and also if it had an unpleasant smell, and he was told that it was not explosive and had very little smell. Mr. Briand had told him that he had frequently dipped a lighted match into it without the slightest fear of danger. It was on these statements that he purchased it. He supposed that the explosion was caused by the vapour thrown off coming in contact with the light the boy was holding. The explosion blew the windows and centre of the shop out, and caused a fire, which had burnt down the whole building. He wished to return the paraffin because many of his customers had complained that it smoked, and was not like what he had supplied them with before. He had none of the paraffin on the premises then. It was all destroyed. There was about 5½ gallons, and he had sold about half a gallon. The Coroner said it was necessary to get some of the oil which he had supplied his customers with, and if he did not know where they lived, if publicity were given by the press to such an important case, which affected life and property, it might be the means of some of the purchasers coming forward with samples of the oil. In reply to Mr. J. H. Johnson, of 47, Lincoln's Inn Fields, who attended on behalf of the Patent Paraffin Oil Company, the witness said that he paid 2*s.* 7*d.* per gallon for the oil, with 2½ per cent. discount. Mr. John Tupping, the next witness, said that he had occupied most of the upper part of the house for two years and a half. When Mr. Masters took the shop he still continued to live on the premises, upon the understanding that he was neither to keep paraffin nor gunpowder upon the premises, which he assured him he would not do. Not more than a month had elapsed before he discovered that he had both gunpowder and paraffin on the premises, without giving him notice of the risk to which he was exposed. He was only insured for £100, and his loss had been £400. Charles Briand, traveller to Messrs. Wills, produced a sample of the oil, such as was kept in stock, but he was unable to say whether Mr. Wills knew from what cask it had been taken, and he did not himself. Mr. Masters said that the pa-

raffin he purchased was of a lighter colour and did not smell like that produced. At this stage the case was adjourned for further inquiry.

Another terrific explosion took place in Birmingham, on Saturday evening, December 7, on the premises of Mr. Barnett, chemist and druggist, and grocer, Jamaica Row, by which several persons have been injured, and much property destroyed. The explosion appears to have taken place in the cellar, which contained oil, naphtha, and several kinds of inflammable liquids, but its origin, whether from the escape of gas, or the vapour of some volatile body, has not been ascertained. It appears from the evidence of a lad named Edwin Taylor, aged fifteen, that shortly after eleven o'clock, a customer came into the shop for some oil, and witness was going into the cellar with a lighted candle in his hand to fetch it, when he was suddenly stunned by a loud report, and thrown to the ground. Mr. Barnett, who was standing in the shop, found himself in the cellar, and on extricating himself, he rushed into the street with his clothes on fire; this however was speedily extinguished, but not before his hands were much burnt. The lad Taylor, who was taken to the General Hospital, is said to be progressing favourably.

Working a Patent for Purifying Paraffin.—Rolls Court, Dec. 5. (Before the Master of the Rolls.) Kernot *v.* Potter, Potter *v.* Kernot.—Mr. Selwyn and Mr. Lindley appeared for the plaintiff; Mr. Baggallay and Mr. Kay for the defendant. The original bill in this case was filed for an account of moneys due to the plaintiff, Dr. Kernot, under an agreement, dated the 10th of January, 1859, by which the plaintiff undertook to take out a patent for an invention for purifying crude paraffin and to assign it to the defendant; and the defendant undertook to work the patent for a term of fourteen years, "in case the patent could be so long worked at a profit," and to pay to the plaintiff a royalty of one-third of the difference between the market price of crude paraffin and the price which he should from time to time receive for the sale of the paraffin to be refined by him according to the said process. The bill also prayed other relief. The cross bill prayed that the agreement might be declared never to have been binding, and that it might be delivered up to be cancelled. The plaintiff duly took out the patent, and the defendant began to work it under the agreement. In December, 1859, the plaintiff called upon the defendant for an account of the profits and payment of the royalty, and thereupon a difference arose as to the mode of calculating the royalty, arising from the fact that 1lb. of crude paraffin produced only $\frac{3}{4}$lb. of refined paraffin. The defendant alleged that the royalty was to be calculated by taking one-third of the difference between the value of a given quantity of refined paraffin and the value of so much crude paraffin as was required to produce such quantity; while the plaintiff contended that it was to be ascertained by taking one-third of the difference between the price of crude paraffin and the price of a like quantity of purified paraffin. The result was that the plaintiff brought an action for the amount which he alleged to be due, and the jury gave a verdict for the sum claimed. The defendant, meanwhile, gave the plaintiff notice that the agreement was at an end, inasmuch as no profits could be realized in working the patent. The verdict at law only determined the question of royalty, not whether the patent could be worked at a profit. The material question at issue between the parties in the present suit was whether the patent could be worked at a profit within the terms of the agreement. His Honour, in giving judgment, said it appeared from the evidence that the market price of crude paraffin was $7\frac{1}{2}d.$ per lb., while refined was $15d.$ per lb. The royalty, at the rate of one-third of the difference between the two prices (which he held to be the true construction of the agreement), was therefore one-third of $7\frac{1}{2}d.$, or $2\frac{1}{2}d.$ per lb. But as 1lb. of crude paraffin produced only $\frac{3}{4}$lb. of refined, 1lb. of crude paraffin when refined would sell for $11\frac{1}{4}d.$ only, and, deducting from this the amount of the royalty, it would leave $8\frac{3}{4}d.$ per lb., from which had to be also deducted $2\frac{1}{4}d.$ per lb., the cost of refining. This would reduce the price to $6\frac{1}{2}d.$ per lb., showing a clear loss of 1d. per lb. His Honour was therefore of opinion that the defendant was clearly entitled to put an end to the agreement, on the ground that the patent could not be worked at a profit, and that the plaintiff was not entitled to any account subsequent to the period of his recovering upon the action at law. His Honour was also of opinion that the defendant failed to show any grounds for cancelling the agreement, as there was no fraud or misrepresentation on the part of the plaintiff. The result was, that both bills must be dismissed, the costs to follow the event.

Attempt to Administer Poison.—York, December 13. (Before Mr. Justice Wightman.)—Richard Buckle, thirty-five, was charged with having, on the 11th of July, at Middlesborough, attempted to administer poison to his wife with intent to murder her. Mr. Blanshard and Mr. Serle appeared for the prosecution, and Mr. Maule for the prisoner. It appeared that the prisoner up to July last was a policeman at Middlesborough, and on the day in question he told his wife he had been talking to Hopper, the gatekeeper at the railway crossing, and that he (Hopper) had given him a powder for her to take. The wife said she was not ailing anything, objected to take it, and said she would wait until the next night. The prisoner told her, in answer to a question, that the powder was in his coat-pocket; also that it was nearly all sugar, but it was bitter; that she was to take it in gin and treacle, and to be ready to get into bed before she took it. A suspicion was aroused in Mrs. Buckle's mind, and next day she took the powder out of her husband's pocket, and went with it to Mrs. Rayner, a near neighbour. The powder was put into another paper, and in the paper which had contained the powder was placed instead some sugar and flour, in order that it might resemble the powder as much as possible. The powder found in her husband's pocket consisted of sugar and strychnine. It appeared that some time previous to this Buckle saw Mr. Henry Landon, a druggist, and asked him the best means of poisoning a dog. Mr. Landon told him that he had a few days before poisoned a dog with strychnine. A few days afterwards the prisoner called at Mr. Landon's shop for some strychnine, and asked how much was sufficient to poison any person. Mr. Landon replied, a grain, and gave the prisoner from fifteen to twenty grains, for which he paid 6*d*. It was wrapped in a piece of white paper, and over the ends was placed a printed label "Poison," so that the poison could not be taken out without destroying the label. Previous to this the prisoner had induced his wife to take some laudanum, which had made her very ill. It was also shown that Hopper had never supplied the prisoner with a powder. For the defence, it was urged that there had been no act done by the prisoner which constituted an attempt to administer the strychnine to his wife. His Lordship said it appeared to him that the case as it stood failed on the evidence adduced. The jury thereupon *Acquitted* the prisoner. The prisoner was committed on another charge, of administering laudanum to his wife, on the 26th of June, with intent to murder her. By direction of the taxing officer, to save expense, a second bill of indictment was not sent up to the grand jury against the prisoner. Mr. Blanshard stated that as the grand jury were now discharged, and another bill could not be preferred, he felt there had been a failure of justice for which he was not responsible. Mr. Maule applied for the prisoner's discharge. His Lordship said, as the evidence had turned out, the case as to the charge of administering laudanum was the stronger of the two. It was a most unfortunate mistake that no second indictment had been preferred at these assizes against the prisoner, and he thought it his duty to remand the prisoner for trial at the next assizes, but reasonable bail would be accepted.

Poisoning by Arsenic.—Warwick, December 17.—Before Mr. Justice Willes. —William Beamish, aged thirty-five, was arraigned, and pleaded "Not guilty" to an indictment charging him with having, at the parish of the Holy Trinity, in the city of Coventry, on the 20th of August last, wilfully killed and murdered Betsy Beamish, his wife, by poison. He was charged with the like crime on the coroner's inquisition.

Mr. Spooner and Mr. Boden were engaged for the prosecution; Mr. O'Brien and Mr. Carew Elers for the defence.

The particulars of this case, as taken before the coroner, will be found in our October number, page 243.

The additional evidence brought forward tended to suggest a possible motive on the part of the prisoner to desire the death of his wife.

The jury returned a verdict of *Guilty*, and his Lordship pronounced the sentence of death in the usual form. The trial occupied nearly twelve hours.

Poisoning by Prussic Acid.—A coroner's inquest was held on Tuesday, December 10, at Kentish Town, by Mr. G. S. Brent, deputy coroner for West Middlesex, on the body of Mr. Francis Robert Smith Upjohn, aged forty-nine, residing as assistant-surgeon with Dr. David Winstone, at 8, Wellington Road, Kentish Town. Miss Up-

john, daughter of the deceased, stated that although her father resided with Dr. Winstone, her mother and the other members of the family lived at 99, Carlton Road. She last spoke to her father on Saturday, December 7. She declined to say what then took place. On Wednesday her little brother delivered a note from her mother to her father. On Friday the family were apprised of his death. Dr. Winstone stated that the deceased, when he came to him, three months ago, was of regular habits. He had since been in the practice of taking laudanum in small quantities, and in consequence was often in a stupid state, as if inebriated. On Thursday, about midnight, witness returned from the country, where he had been since the preceding Sunday. The prisoner was then well. On Friday morning, shortly after nine, the housemaid rushed into the sitting-room, exclaiming, "Dr. Upjohn is dead." Witness immediately went to the room, and found the deceased dead in bed. A bottle of prussic acid lay on the floor, and there could be no doubt that his death was caused by that poison. It was probable that the deceased had taken the prussic-acid bottle by mistake for that from which he was in the habit of taking laudanum, as both bottles were of the same size, and might have been standing together on the surgery table. The jury, after adverting to the hesitating manner in which Miss Upjohn had given her evidence, returned an open verdict, to the effect that the deceased died from the effects of prussic acid, there being no evidence to show whether the poison had been taken purposely or by mistake.

Poisoning by Artificial Flowers.—On Monday, November 25, an inquiry was held by Mr. G. S. Brent, touching the death of Matilda Scheurer, a good-looking girl of nineteen, who died from poison imbibed into the system during her engagement in the manufacture of artificial flower-leaves. Mrs. Louisa Scheurer, a widow, and mother to the deceased, deposed that on Thursday week her daughter was taken ill. She was seized with vomiting, and the refuse of the stomach was of a very greenish colour. The witness took her to a doctor on the following morning, who told her she was again suffering from the effects of poison. She had been ill several times before, complaining of pains in the stomach and sickness, for the last year and a half. She was engaged as an artificial florist in the warehouse of M. Bergeron of Judd Street, Brunswick Square, and up to the time of her death she had been engaged in the leafmaking. She was in the greateat pain until she became insensible, when death put an end to her sufferings. Mr. James Thomas Paul, surgeon, of 26, Burton Crescent, said he had attended the deceased four times within eighteen months, while suffering from the same causes. He had made a *post-mortem* examination, and found that the lungs gave evidence of the presence of arsenite of copper, the liver being highly impregnated, as also the mesenteric glands. The cause of death was acute inflammation of the mucous membrane of the stomach, produced by the inhalation of the arsenite of copper. A sister of the deceased had died under similar circumstances. M. Bergeron said he employed ninety-eight girls in his establishment, and for their protection he had suggested the wearing of masks, but it was objected to by them as producing excessive heat. They however wore muslin over their mouths. It was stated by a juror that the arsenite of copper in such manufactures was prohibited in France, as injurious to workpeople. The jury returned a verdict to the effect that the deceased died accidentally, from the effects of mortal disease in her stomach and other organs, occasioned by arsenite of copper used in her employment.

BOOKS RECEIVED.

THE LITERARY AND SCIENTIFIC REGISTER AND ALMANACK FOR 1862 (TWENTY-FIRST YEAR). By J. W. G. GUTCH, M.R.C.S.L., etc. London: W. Kent and Co., Paternoster Row.

The great variety of information, in a tabular form, contained in this Annual Register, renders it a very handy little book of reference.

The new feature in the present issue is an article on Botany, the arrangement of which is that adopted by Professor Harvey, of Dublin.

A MANUAL OF STRUCTURAL BOTANY: For the use of Classes, Schools, and Private Students. By M. C. COOKE, with upwards of two hundred illustrations by RUFFLE. London: Robert Hardwicke, 192, Piccadilly.

Transactions of the Medical and Physical Society of Bombay, No. 6, New Series for the Year 1860. Bombay: 1861.

The Madras Quarterly Journal of Medical Science in all its Branches; including Original Essays, Reviews, Reports, and Medical Intelligence. No. 6, October, 1861. Madras: Gantz, Brothers, Adelphi Press. London: H. G. Bohn, York Street, Covent Garden.

Chemical Tables. By Robert Galloway, F.C.S. London: Churchill, New Burlington Street. (From the Publisher.)

CAUTION.

Messrs. R. Rouse and Co., Wigmore Street, request us to "warn the trade against customers (?) who bring in a prescription for pills and mixture, and request that the medicine, 'with a bottle of Cod-liver Oil,' may be sent to some well-known address in the immediate neighbourhood, and will 'take with them a pint bottle of the finest Eau de Cologne,' about the quality of which they appear exceedingly anxious, as Mrs. —— (the name on prescription) is 'very particular about it.' Of course Mrs. —— does not exist at the address given nor anywhere else."

TO CORRESPONDENTS.

An Outsider.—(1.) Under the circumstances referred to, the usual interval between the examinations would be dispensed with. (2.) Yes. (3.) A general knowledge of the Pharmacopœia is indispensable.

A. G. (Lower Clapton.)—Ammoniated Solution of Quinine. See vol. xiii. p. 344.

R. A. V. S.—(1.) 'Hoblyn's Dictionary of Scientific Terms.' (2.) Hooper's 'Medical Dictionary,' 30*s.* (3.) We know of no work on the subject.

Juvenis.—(1.) The price of Ure's *Eudiometer* is about 9*s.*, and may be obtained of any scientific instrument-maker. (2.) Pouillet's 'Élémens de Physique,' 21*s.* (3.) About 2*s.* 6*d.*

T. C. (Bedford.)—We should think not.

Flora. (Sheffield.)—The collections for competition for the Botanical Prizes are intended to comprise all plants found growing wild in the British Islands.

Botanicus. (Bristol.)—Royle's 'Manual of Materia Medica and Therapeutics,' price 12*s.* 6*d.*; and Bentley's 'Manual of Botany,' price 12*s.* 6*d.* Both works are published by Churchill, New Burlington Street.

W. G. K. (Market Drayton.)—Ordinary carbonate of lime is intended.

M. P. S. (Leamington.)—There is no published formula for *Tinctura Sinapis Composita.* Mr. W. Hearder, of Torquay, is the proprietor of the article.

W. M. R.—Applications should be made by letter to the Director-General of the Army Medical Department, Dr. J. B. Gibson, Whitehall.

A. P. S. (Chelsa.)—*Chlorophyll* is obtained from green leaves, by treating them with alcohol, in which it is soluble, and afterwards evaporating to dryness. The leaves may be previously exhausted with water, which does ot dissolve the chlorophyll.

J. H. Wetherby.—Paraffin comes over with the last products of distillation from tar or mineral oil. These products are treated with oil of vitriol, which forms with part of the oils present a black viscid mixture over which the paraffin floats. Its separation and purification however are attended with difficulty.

B. B. T.—Apiol is a medicine introduced from Paris, said to be obtained from parsley seeds.

An Advocate of Progress thinks the propositions made by Mr. Halliday, in our October and December numbers, "neither advisable nor practicable."

The communications of *An Old Member*, *A. A.*, *S. H.*, *H. W. Stuart*, *J. P. Boyce*, *J. Thompson*, and others are received, but want of space prevents their being noticed this month.

Instructions from Members and Associates respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editors, 17, Bloomsbury Square.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. III.—No. VIII.—FEBRUARY 1st, 1862.

THE AUTHORITY OF THE PHARMACOPŒIA.

In discussing the preparation of medicines ordered in the Pharmacopœia, it has frequently been assumed that a license was given by the College for deviating from the precise instructions contained in the formulæ, if manufacturers could devise better modes of producing the results specified; and in support of this assumption reference has been made to a sentence in the preface to the present Pharmacopœia (1851), which, as translated by Mr. Phillips, is to the following effect:—"But although we have devoted the utmost care and attention in our power to the methods of obtaining these, and all our other preparations, we are aware that skilful chemists, who understand their profession, may attain the same results by less expensive or even by more convenient processes." The supposed license implied in this sentence was referred to some years ago, in 1854-55, in discussing the subject of Infusions, and Dr. Farre at that time took some pains to explain on behalf of the College what was the true purport of the sentence, which, as he showed, was not quite correctly translated by Mr. Phillips. Dr. Farre's statements will be found at pages 341 and 422 of the 14th volume of this Journal, first series. The context to the sentence quoted shows that the preparations referred to were chemical compounds of definite constitution, such as calomel and corrosive sublimate, which may be prepared by any processes yielding the same definite products as those of the processes given in the Pharmacopœia, but no such license was ever intended to apply to the preparation of such medicines as infusions, extracts, etc. It is obvious in these latter cases that if manufacturers be allowed to adopt the processes they might individually consider the best, the products would be likely to assume so indefinite a character as materially to affect their advantageous employment in the treatment of disease. We have reason to believe that the statement made in the preface to the Pharmacopœia is still misunderstood by some of our members, and we are therefore anxious to refer them to Dr. Farre's communications on this subject.

THE IMPROPER INTRODUCTION AND DESIGNATION OF NEW MEDICINES.

When the Legislature passed an Act rendering penal the sale of a mixture of coffee and chicory, unless the mixture was clearly labelled as such, it confirmed an important principle which is too little regarded in commercial dealings. The admixture of chicory with coffee, though fraudulent in its origin, is no longer considered an adulteration, for the public, we are told, *prefer* the mixture to pure coffee. There are but few other commodities in which this is the case: nobody, for instance, prefers his pickles coloured with copper, or his cayenne pepper with red lead, or that his beer should be *strengthened* with *Cocculus Indicus*—nor would any one willingly buy horseflesh for beef or dripping for butter. But if it is desirable that articles of food should be known under their proper names, it is no less important that medicines should be correctly designated. It is true that the names of many compounds found in the shop of the chemist, have slipped from their original meanings; the spirit of hartshorn is no longer made from the horns of the hart, nor is salt of tartar now prepared from cream of tartar. But in these cases there is no breach of faith and no deception is intended, inasmuch as the articles now sold represent in an improved shape those of former days: moreover the names in question are popular and never employed by the man of science. There are other compounds for the designations of which we cannot make so good an apology; the *Pâte de Jujube* and *Pâte de Guimauve* never, we believe, contain either of the drugs whose names they bear; and the calcined hartshorn, and prepared oyster-shells and red coral are too often imitations of the legitimate articles.

But there is another practice of incorrect designation, of a much more serious nature, against which we think it needful to raise a protesting voice, and which, as it is of but recent growth, we trust the general good sense and honest feeling of the pharmaceutical body will join us in repudiating. We allude to the practice of introducing to the notice of the medical profession a new medicine under a chemical name which *misrepresents* its actual composition. Some months since a writer in this journal drew attention to a case of this sort, showing that a substance sold as "*Citrate of Magnesia*" was in reality composed of tartaric acid and carbonate of soda with a very little Epsom salt, and therefore totally distinct from that which its name implied; and other cases of a parallel nature will readily occur to our readers. Now it is this kind of misnomer against which we protest. A definite chemical name implies a definite chemical compound; and to use such a name knowingly, where it has no right to be used, is simply to impose upon the good faith of the medical profession:—it is "sailing under false colours," and is a proceeding as unworthy of commercial integrity as it is of the truthfulness of science.

A consideration of the preparations against which these strictures are directed, naturally leads to that of a much larger group, which at the present day necessitate no small share of attention on the part of the pharmaceutist. Any one at all familiar with the dispensing counter, must be struck with the frequent occurrence of prescriptions ordering articles for which there are no formulæ in the pharmacopœia. Some of these articles have been long in use and are consequently, in some form or shape, kept by all chemists. Of this class, *Liquor Taraxaci*, Chloric Ether and Citrate of Iron with Quinine, are good examples; they are established medicines, and, as such, will probably be recognized in the forthcoming pharmacopœia. Following in the wake of these there is an extensive and miscellaneous class of aspirants to medical favour. For some of them, formulæ have been published in the pages of this or other

journals; but there is a large number which must be placed in the category of secret medicines. Now of the first of these we have little to say, for however unnecessary and improper many of them may be (and undoubtedly are), the composition of each having been made public, the physician can exercise his judgment how far any will meet the requirements of his patient, while the chemist may please himself whether he will manufacture according to the given formula or purchase from the inventor. This seems to be the only legitimate method of introducing a new medicine. The second group of non-pharmacopœial articles, namely those for which no published formulæ exist, are those which occasion the greatest perplexity and annoyance. Inventive chemists are numerous, and the admirers of novelty are numerous also:—the consequence is that scarcely a week passes without some new "*liquor*" or new syrup, or new phosphate, per-, bi-, or super-, or hypo-phosphite, or combination of iron and quinine, being, as the phrase goes, "offered to the notice of the profession." Of most of these preparations the reputation is quite ephemeral; the inventing chemist sends specimens round to the physicians in his neighbourhood, some of whom generally give trial to the new medicine by prescribing it, until it is forgotten or set aside by a fresh novelty. Many of these new medicines have titles which are sufficiently amusing: here is one which is called a *Detergent Solution of Carbon*, a name about as expressive as would be that of *Narcotic Solution of Carbon* for a solution of morphia, or *Febrifuge Solution of Carbon* for one of quinine. Then we have "*Liquor ferri oxycitratis*," "*Liquor ferri magneto-phosphatis*," "*Liquor castanea equina*," of which, to quote the advertisement, "two or three doses will often arrest the most acute paroxysms of gout, and is of great service in chronic rheumatism"; "*Ærated Fluid Extract of Bark*," declared to be, and with truth, "a novelty in medicine," and "produced by a Committee of Chemists and Capitalists"! O precious union of wealth and talent! How nobly applied in the production of "this pre-eminent tonic"! Next appear chemical syrups in great force and wondrous complexity, but they are too numerous to discuss generally,* so we will mention here only one which rejoices in the remarkable label of "*Syrupus quinæ ferrique superphosphatis cum strychniæ phosphate*" with the addition that it is to be well shaken before taken,—a most proper direction, seeing that it contains an ominous amount of solid matter.

Here let us pause to ask if names and medicines such as these are creditable to modern pharmacy. Are they invented to promote the end and object of our art, the cure of disease,—or are they designed for mere trade purposes? Let us consider again if medical science is promoted by the introduction and use of a *farrago* of preparations, in the composition of many of which there is so little simplicity and so much obscurity? Is it not important that medicines of great potency should be administered in the most definite forms?—such forms in fact as will enable the practitioner to ascertain and observe their effects with the least ambiguity? If this be true and it be admitted, that simplicity is preferable to complexity, the definite to the indefinite and the authorized to the unauthorized, our new medicines will be fewer in number, but they will be more deserving attention than is at present the case.

D. H.

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* Under the class of chalybeate syrups alone, we have the following:—
Syrupus ferri hypo-phosphitis, Syr. ferri et manganesii hypo-phosphit., Syr. ferri et calcis hypo-phosphit., Syr. ferri iodidi c. manganesio, Syr. ferri iodidi c. quinâ, Syr. ferri et potassii iodidi, Syr. ferri carbonatis, Syr. ferri pyro-phosphatis, Syr. ferri proto-chloridi, Syr. ferri perchloridi, Syr. ferri bromidi, Syr. ferri lactatis, Syr. ferri superphosphatis, Syr. ferri et calcis superphosphatis, Syr. ferri et manganesii superphosphatis, Syr. ferri, calcis, sodæ et potassæ phosphat., etc. etc.

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, 1*st January*, 1862,

Present—Messrs. Bird, Deane, Hanbury, Haselden, Hills, Leseher, Meggeson, Morson, Savage, Squire, and Waugh,—the following were elected

MEMBERS.

WANDSWORTH.....Norrish, James.
DERBY.....Frost, George.
NORTH SHIELDS.....Brown, William Henry.

An address of condolence to Her Majesty was ordered to be presented, of which the following is a copy:—

"To the Queen's Most Excellent Majesty.

"We, your Majesty's loyal and dutiful subjects, the Council of the Pharmaceutical Society of Great Britain, humbly approach your Majesty with the assurance of our devoted affection for your Majesty and for your Royal family.

"Deeply affected by the sudden and lamented decease of his late Royal Highness the Prince Consort, we desire permission to express our sincere and heartfelt sorrow, and to offer to your Majesty our deep sympathy and condolence on the occasion of this great affliction.

"The warm interest his late Royal Highness always evinced in the promotion of arts, literature, science, and everything conducive to the happiness and welfare of this his adopted country, justly entitle him to the esteem and admiration of all your Majesty's subjects, and the memory of his exalted character will be held in reverence by the latest posterity.

"That a kind Providence may vouchsafe to your Majesty health, fortitude, and resignation to bear this sad bereavement, is our most sincere and earnest prayer."

A Grant of Twenty-five Pounds from the Benevolent Fund was given to a distressed Member.

ERRATUM.—Page 348, line 14, for Walton, Henry, read Watton, Edward.

SPECIAL MEETING OF THE COUNCIL.—15*th January.*

Present—Messrs. Bird, Bottle, Bucklee, Davenport, Hanbury, Haselden, Herring, Hills, Leseher, Morson, Sandford, Squire, and Waugh.

MAJOR EXAMINATION, 14*th January.*

Francis, Robert Dolbey.....Bishops Castle.

MINOR EXAMINATION.

Flesher, Sanderson.....Scarborough.
Holgate, Walter.....Liverpool.
Pearson, Henry Jackson .....Louth.
Swenden, James.....Darlington.
Tilden, William Augustus .....Barnsbury Park.

REGISTERED APPRENTICE.

NAME.	RESIDING WITH.	ADDRESS.
Pritchard, Urban	Mr. Stevens	112, Cheapside.

EXAMINATIONS IN EDINBURGH, *8th January*, 1862.

MAJOR.

Allan, Bruce .....Edinburgh.
Nesbit, John .....Berwick.
Watson, James .....Montrose.

REGISTERED APPRENTICE.

NAME.	RESIDING WITH.	ADDRESS.
Hutchinson, Marshall Henry	Messrs. Macfarlan & Co....	..Edinburgh.

SPECIAL GENERAL MEETING FOR THE CONFIRMATION OF THE BYE-LAWS.

On Wednesday, the 15th of January, a Special General Meeting of the Members of the Pharmaceutical Society was held at the house of the Society at one o'clock P.M.,

MR. PETER SQUIRE, PRESIDENT, IN THE CHAIR.

The PRESIDENT, in opening the proceedings, said the Meeting had been called for the special purpose of approving and confirming the altering, amending, and abrogating of the existing Bye-laws of the Society, and the making and establishing of new Bye-laws, as represented in the last preceding number of the 'Pharmaceutical Journal.' The proposed alterations had been well considered by the Council, and having been published in the Journal, he had no doubt the Members present had made themselves acquainted with them. One point it was necessary they should bear in mind, namely, that the proposed alterations must be dealt with as a whole, and either confirmed or rejected by the Meeting, as it was necessary that any alterations that might be made should originate with the Council.

Mr. FLUX (Solicitor to the Society) confirmed the statement made by the President, that in accordance with the Act of Parliament, the proposed new Bye-laws must be accepted or rejected by the Meeting in their entirety.

The proposed Bye-laws, as printed in the last number of this Journal, having been taken as read,

Mr. SANDFORD, the Vice-President, moved:

"That the code of Bye-laws which has been read by the Secretary be confirmed and approved as the Bye-laws of the Society, and take effect from the date of confirmation and approval thereof by one of her Majesty's principal Secretaries of State, and that all other Bye-laws of the Society be abrogated."

He directed attention to the objects and purport of the different alterations they proposed making. Owing to the dying out of the old Members, the funds in a few years would be inadequate to the wants and requirements of the Society. Even should they keep up their Members as they had hitherto done, of which there was every probability, still the five-guinea fee or composition for Life Membership now paid, was so disproportionate to the old subscription of a guinea a year, that it would necessarily cause a falling off in the future income of the Society, and they wished to adopt early means of providing against such a result. He then referred in detail to the new laws, pointing out where they differed from the old, either essentially or only verbally.

Mr. Bottle, of Dover, seconded the motion, and stated in reference to the confirmation of the Bye-laws by the Meeting, that he recollected on a former occasion, when he was not a Member of the Council, he had desired to make a slight alteration at a General Meeting similar to the present, but found the Meeting had no power of doing so. There had, however, been no desire on the part of the Council to prevent the expression of opinion of the Members, and evidence of this had been given by the discussion of the subject in the Journal. What the Council was desirous of doing was to make the Society worthy of the important body they represented. Much had been done towards improving the institution, and they must take care that an adequate income was provided for its efficient maintenance. Five or six years ago he had shadowed forth his conviction that an alteration of the Bye-laws similar to what was now being made would become necessary from the dying out of the old subscribing Members. The principal alteration proposed would have the effect of restoring the original mode of supporting the Society by annual subscriptions instead of five-guinea compositions. He thought there would be no objection to this alteration, and he had therefore much pleasure in seconding the motion for its adoption.

Mr. Dickinson was sorry to find himself under the necessity of moving an amendment to the effect "that the new Bye-laws be not approved and confirmed by the Meeting." Before entering on the subject of his objection to the confirmation, he wished to ask the Members of the Council present, whether they intended voting on the confirmation of their own proposition, for seeing the small number of the Members of the Society who had come to the Meeting, it was obvious that if the Council voted, they would carry their point.

The President said he thought Mr. Dickinson was rather out of order in asking such a question. The Members of the Council of course were Members of the Society, and of the Meeting, and not only had a right to vote, but might have a duty to perform in doing so.

Mr. Waugh said undoubtedly the Members of Council would claim and exercise the right of voting as Members of the Society if necessary.

Mr. Dickinson was sorry to hear what had just been stated, especially as there were so few Members present, which he thought was an indication of disapproval by the Members at large of what the Council were doing. He was ready to give the Council credit for having devoted much time and attention to these alterations, and no doubt it had cost them much anxiety; but there was one point especially in reference to which he could not approve of the result; in fact, he considered that for many years the Council of the Society had been pursuing a wrong course. He had not for some time past attended their Meetings, nor taken much interest in their proceedings, and the present was probably the last time he should come among them. He had come on this occasion to protest against an alteration which he considered involved an important principle, and was decidedly wrong. The second clause in the first section of the proposed new Bye-laws was what he especially referred to. He con-

sidered that this gave a power to the Council to admit whoever they thought proper upon any qualification they considered sufficient. Knowing the desire the Council had previously expressed of admitting Chemists without examination, he could not help thinking that this clause was intended covertly to enable the Council to carry out that desire. It was clearly opposed to the tenth clause of the Pharmacy Act, and this constituted the ground upon which he opposed the confirmation of the new Bye-laws. He then entered into a discussion of many other points connected with the management of the Society, and concluded by moving that the new code of Bye-laws be not approved and confirmed by the Meeting.

Mr. Flux (the Solicitor) said it was the opinion of those who had framed these Bye-laws that by clause 2 of Section I., the Council could only elect those as Members who were eligible according to the qualifications specified elsewhere. There was a clause, however, in the old Bye-laws, which had been omitted in the new code, and which, if inserted, would put the point beyond question.

Mr. Breton, of Brighton, seconded the amendment. He urged that as the clause referred to by Mr. Dickinson appeared to be of doubtful construction it would be better to alter it, and as the Meeting could not do this, they had no alternative but to send the Bye-laws back to the Council for such alteration.

Mr. Randall, of Southampton, supported the original motion. He said a Meeting of the Members in his locality had been held, and he was authorized to express their general assent to the proposed alterations. He did not consider the smallness of the attendance at the present Meeting an indication of want of confidence in the Council, but the contrary.

A long discussion then took place, in which it was stated that the Council had no intention of opening the door for the admission of Members without examination, but that it was necessary they should have the means of admitting Honorary Members and others, in accordance with the provisions of the Charter and Act of Parliament. A rider to the original motion was suggested, pledging the Council either to omit the second clause of the first Section, or to introduce a new clause that would more clearly define the power of the Council in admitting Members, but it was ultimately agreed that this should be left to the Council, and with this understanding the amendment was withdrawn, and the original motion carried unanimously.

The Meeting was concluded with a vote of thanks to the President.

ON SPECTRUM ANALYSIS.

A Lecture delivered before the Members of the Pharmaceutical Society of Great Britain, on Wednesday evening, Jan. 15.

BY W. A. MILLER, M.D., LL.D., V.P.R.S, PROFESSOR OF CHEMISTRY, KING'S COLLEGE, LONDON.

The subject which I propose to bring before you on the present occasion is one which from the striking character of its results, the precision of the observations, and the extension of views to which it has given rise, has attracted a large share of the attention, not only of the scientific community, but also of that of educated persons in general.

It must not, however, be supposed that the subject is a new one, or that it has reached its present development by the exertions of any single individual. It may not, therefore, be uninteresting to trace the principal steps of

discovery, from the time of Newton, who first examined the solar spectrum, to the present day.

Newton, by admitting a beam of solar light through a small *circular aperture* into a darkened room, and allowing it to fall upon a triangular prism of glass, obtained the magnificent coloured image known as the *solar spectrum*, which shades off by insensible gradations from the least refracted red into the most refracted or violet portion of the light. But it does not appear that any one, till Wollaston's time, a century later, examined the effect of admitting the light through a narrow slit, with sides parallel to those of the prism (Phil. Trans. 1802, 378). Wollaston found that the spectrum so obtained was not, as it appeared to be by Newton's mode of examination, a continuous stripe of light, but that it was crossed at right-angles to its length by dark bands.

It was not, however, till 1815 that these dark bands were carefully examined, when the celebrated German optician, Fraunhofer, published a minute description of them, accompanied by a careful map, in which he figured more than six hundred of these lines, which have ever since borne the name of *Fraunhofer's lines*. The more important of these lines he distinguished by the letters of the alphabet, and in the uppermost spectrum shown in the figure at p. 409, a few of them are given as points of comparison with other spectra.

As Fraunhofer's mode of observing the spectrum is essentially that adopted by all subsequent inquirers, it will be necessary to point out the leading features of the method which he employed. The sun's light having been admitted through a narrow vertical slit into a darkened room, was allowed to fall upon a prism placed with its axis parallel to the slit, and at a distance of about twenty-four feet from it. The prism was fixed before the object-glass of a telescope, of low power, in such a manner that the angle formed by the incident light with the first face of the prism, was equal to that formed by the refracted beam with the second face. Under these circumstances he observed numberless vertical lines, varying in breadth and in strength in different parts of the spectrum. These bands were always visible, whatever was the solid or liquid medium used in the construction of the prism, and whether its refracting angle were great or small; and under all circumstances they preserved the same relative position in the respective coloured spaces in which they occur.

When, however, the source of the light was varied, as if the flame of a candle, the light of the fixed stars,* or the spark from the electrical machine was made use of, a different set of lines was in each case observed to occur.

Beyond this fact, viz. the dependence of the position of the lines upon the source of the light employed, Fraunhofer was unable to ascertain anything connected with their cause.

The inquiry thus launched by Fraunhofer has been followed in four principal branches of research, which may be described as relating to—

1. *Cosmical lines*, or the black lines produced in the light of the sun, the planetary bodies, and the fixed stars.

2. *Black lines produced by absorption*, a class of phenomena discovered by Sir D. Brewster, in his observations upon the red vapours of nitrous acid.

3. *Bright lines produced by the electric spark* when taken between different conductors.

4. *Bright lines produced by coloured flames* or by the introduction of different substances into flame.

* The Moon and Venus exhibited lines corresponding with those of the Sun. Sirius showed different lines, and Castor others again different. Amongst the lines of Procyon, Fraunhofer recognized the solar line D, and in those of Capella and Betalgeus, he described both D and *b*.

The following chronological table contains the names of those who have made the principal steps in these different subjects.

Newton	1701
Wollaston	1802
Fraunhofer	1815

COSMICAL.	ABSORPTION BANDS.	ELECTRIC LIGHT.	COLOURED FLAMES.
Brewster, 1832.	Brewster, 1832.	Wheatstone, 1835.	Brewster, 1822.
E. Becquerel, 1842.	W. H. Miller and Daniell, 1833	Foucault, 1849.	Herschel, 1822.
Draper, 1842.	W. A. Miller, 1845.	Masson, 1851–55.	Fox Talbot, 1826, 1833, 1834.
Stokes, 1852.		Angstroin, 1853.	W. A. Miller, 1845.
Brewster, and Gladstone, 1860.		Alter, 1854–55.	Swan, 1857.
		Secchi, 1855.	
		Plücker, 1858–59.	
		V. Willigen, 1859.	

Kirchhoff	1859
Kirchhoff and Bunsen . .	1860.

1. *The cosmical lines* admit only of partial illustration in the lecture-room by means of photographs, by which they may be projected upon the screen. Most of these lines shown by the photograph are, however, invisible to the eye, as they occur in that part of the spectrum which is more refrangible than even the violet rays. Edmond Becquerel* was the first who received the impression of the spectrum with suitable precautions upon a Daguerreotype plate, and he made the important and interesting discovery that the inactive spaces in the portion of the chemical spectrum produced by visible rays, correspond accurately with the dark lines of Fraunhofer,—a discovery immediately afterwards corroborated by the independent observations of Dr. Draper, of New York, and subsequently confirmed in a remarkable manner for the invisible rays, by Stokes, who (Phil. Trans. 1852) succeeded in rendering the lines in the most refrangible and extra-violet portions apparent to the eye, by his discovery that the fluorescent power of the spectrum was interrupted by inactive spaces, the position of which corresponded accurately with the lines observed by Becquerel.

2. *The absorption bands* produced by coloured gases were first indicated in 1832 by Sir David Brewster (Phil. Mag., May, 1836, viii. 384), who found that the brownish-red vapours of nitrous acid have the remarkable power of absorbing the sun's rays in such a manner as to produce a series of dark bands in the light when transmitted through it. Professors W. H. Miller and Daniell subsequently showed that the same effect is produced, whatever be the source of light employed. In the course of this investigation, an important observation was made by Brewster, who noticed distinct lines and bands in the red and green spaces, which at other times wholly disappeared. This he found to be due to an absorptive action of the earth's atmosphere; for these bands were only visible when the sun approached the horizon. A few years later I had an opportunity myself, whilst examining the spectrum of diffused daylight in the afternoon during a violent thundershower, to observe the sudden appearance of a group of lines in the brightest part of the spectrum, between D and E, increasing in distinctness with the violence of the shower, and fading and dis-

* 'Bibliothèque Universelle de Genève,' August, 1842, No 80; or Taylor's 'Scientific Memoirs, ii. 537.

appearing as the rain passed away. These observations, therefore, prove that certain of the fixed lines in the solar spectrum are dependent in part at least upon the absorptive action exerted by the earth's atmosphere. But the larger portion, it is supposed, are due to another cause, first suggested by Kirchhoff. Professor Miller, of Cambridge, in conjunction with Professor Daniell, followed up these experiments, and showed that other coloured vapours, viz. those of bromine, iodine, and euchlorine possessed this property (Phil. Mag. 1833, ii. 381).

Twelve years afterwards I myself made a numerous series of experiments upon the same subject (Phil. Mag. xxvii. 81). The result of these experiments showed that mere existence of colour in vapour does not indicate of necessity the existence of bands in its spectrum. The red vapours of chloride of tungsten give no lines, while bromine, which has to the eye the same colour, gives a remarkable series.

"The probable position of the lines cannot be inferred from the colour of the gas; with the green perchloride of manganese the lines are most abundant in the green, whilst with the red vapours of nitrous acid they increase in number and density as they advance towards the blue end of the spectrum. Simple bodies, as well as compounds, may produce lines; and two simple bodies, which singly do not produce them, may in their compounds occasion them abundantly; *e.g.* neither oxygen, nitrogen, nor chlorine, when uncombined, occasions lines, but some of the oxides, both of nitrogen and of chlorine, exhibit the phenomena in the most striking manner. There are however oxides both of nitrogen and chlorine, [some of them coloured,] which do not occasion the appearance of lines. We find also that lines may exist in the vapour of simple substances, as in iodine, which disappear in their compounds. This is exemplified in the case of hydriodic acid. . . . Sometimes the same lines are produced by different degrees of oxidation of the same substances, a remarkable instance of which is furnished in the oxides of chlorine." . . . Coloured lithographs of several spectra accompany the paper, including those of bromine, iodine, peroxide of nitrogen, perchloride of manganese, and peroxide of chlorine.

3. *On the Spectra of the Electric Spark.*—Wollaston (Phil. Trans. 1862) observed that the spectrum of the electric spark is not continuous, and that it differs from that of ordinary sunlight, as well as from that furnished by the light of a candle. Fraunhofer also has a similar observation, but the first person who called attention to the important fact that the nature of the metals employed modifies the resulting spectrum, was Professor Wheatstone, who, at the Dublin meeting of the British Association for 1835, read a paper "On the Prismatic Decomposition of the Electric, Voltaic, and Electro-Magnetic Sparks." In the abstract published in the Report of the Proceedings of the Association for that year, the author states that,—1. "The spectrum of the electro-magnetic spark taken from mercury, consists of seven definite rays only, separated by dark intervals from each other. These visible rays are, two orange lines close together, a bright green line, two bluish-green lines near each other, a very bright purple line, and lastly a violet line." 2. "The spark taken in the same manner, from zinc, cadmium, tin, bismuth, and lead in the melted state, gives similar results; but the number, position, and colours of the lines vary in each case. The *appearances are so different that by this mode of examination the metals may be readily distinguished from each other.*" A table accompanied the paper, showing the position and colour of the lines in the various metals used. . . . 3. "Where the spark of a voltaic pile was taken from the same metals, still in the melted state, precisely the same appearances are presented. 4. The voltaic spark from mercury was taken successively in the ordinary

vacuum of the air-pump, and the Torricellian vacuum, in carbonic acid gas, etc., the same results were obtained as when the experiment was performed in air, or in oxygen gas. The light therefore does not arise from the combustion of the metal. Professor Wheatstone also examined by the prism the light which accompanies the combustion of the metals, in oxygen gas, and by other means, and found the appearances totally dissimilar to the above. . . . 5. When the (electric) spark is taken between balls of dissimilar metals, the lines appertaining to both are simultaneously seen."

The next point of importance relating to the subject of the spectrum produced by ignition in the voltaic arc, is due to M. Foucault, who in 1849 published in the 'Journal de l'Institut,' February 7, a note on the light of the voltaic arc, reprinted in the 'Ann. de Chimie et de Physique,' III. lviii. 476. In this paper he says:—"I caused a solar image, formed by a converging lens to fall upon the arc itself, an arrangement by which I was able to observe simultaneously the superposed solar and electric spectra, and I observed myself in this manner that the double brilliant line of the arc coincided exactly with the double black line of the solar light.

"This method of investigation enabled me to make some unexpected observations. In the first place it proved to me the extreme transparency of the electric arc, which only casts a slight shadow upon the solar light. It has shown me that this arc, placed in the track of a beam of solar light, absorbs the rays D, so that the said line D of the solar light is considerably strengthened when the two spectra are exactly superposed. When, on the contrary, they only partially overlap each other, the line D appears darker than usual in the solar light, and stands out brightly in the electric spectrum, so that it is easy to judge of their perfect coincidence. Thus the arc offers us a medium which itself emits the rays D, and which at the same time absorbs them when they come from another luminous source. In order to make the experiment in a still more decisive manner, I have projected upon the arc the reflected image of one of the incandescent points of carbon, which, like all ignited solids, emits no lines; and in these circumstances the ray D appeared to me as in solar light."

The observations of Foucault contain the germ of Kirchhoff's important generalization, but their ingenious author was far from perceiving their full importance.

The next observer whom we have to notice is M. Masson, who, in 1851 and 1855, in the course of his investigations on electric photometry ('Ann. de Chimie,' III. xxxi. 295, and xlv. 387), examined the spectra produced by various metals which were employed as dischargers to the Leyden jar, and also when heated by the voltaic arc, and gave drawings of the different spectra, made by means of the camera lucida. The spectra which he has given of the same metals which were examined by Wheatstone, are much more complicated than those described by the English philosopher. These discrepancies were subsequently explained by Angstrom (Phil. Mag. 1855, p. 329), and by Alter (Silliman's Journal, xviii. 55, and xix. 213), who showed that owing to the intense heat of the electric discharges employed by Masson, he obtained two spectra simultaneously, one due to the metal, the other to the atmosphere itself, which became ignited. Certain lines remarked by Masson common to the spectra of all the metals were really these atmospheric lines. By causing the spark to pass between the same metals when immersed in various gases, the particular lines due to the metal remained unaltered, whilst the others, due to the gaseous medium, disappeared, and were replaced by new lines. Angstrom, in the course of his paper, makes the following remarkable observations, which suggest, though they do not distinctly state, the explanation of Fraunhofer's dark lines, subsequently brought forward by Kirchhoff:—

"When the solar spectrum is compared with the electric one, it is found that some of the lines, such as C, D, E, and we may also say H, have their corresponding lines in the solar spectrum, but for the strongest, γ and δ, this is not the case. . . .

"*Regarded as a whole, they produce the impression that one* [*spectrum*] *is a reversion of the other.* I am therefore convinced that the explanation of the dark lines in the solar spectrum embraces that of the luminous lines in the electric spectrum."

In 1858 and 1859, an important series of investigations was published by M. Plücker (Poggendorff's Annal. ciii. 88, 151, civ. 113, 622, cv. 87, cvii. 77, 498), relating to the character of the electric light produced by transmitting the secondary discharge from Ruhmkorff's coil through narrow tubes filled with different gases, and subsequently exhausted as completely as possible. Vacuous tubes were thus obtained with only imponderable traces of various gases and vapours, including oxygen, hydrogen, nitrogen, chlorine, bromine, and iodine. Plücker found that each exhausted tube gave its own characteristic spectrum, and he measured with great care the principal lines visible in each. These results are very important in relation to Kirchhoff's theory of the cause of the dark lines, which requires that the position of bright lines thus obtained, should coincide with the black lines produced by absorption when light is transmitted through these different gases. Plücker's experiments show distinctly that this is not the case in these gases.

Van der Willigen (Poggendorff's Annal. cvi. 617) corroborated the observation of Angstrom on the effect of gaseous media on the lines furnished by the spark between different metals, and he further made the interesting remark that, by placing in succession upon a pair of wires consisting of a metal which, like platinum, possessed no special bands of its own, small quantities of weak solutions of chloride of calcium, chloride of barium, chloride of strontium, nitrate of lime, etc., new metallic bands are produced, and these bands are characteristic of the particular metal contained in each of these several compounds.

4. *Spectra of Coloured Flames.*—The first person who seems to have examined a coloured flame by means of the prism, was Sir David Brewster, who proposed as a source of achromatic light, the flame of diluted alcohol, which he found gave a fine homogeneous yellow, with faint traces of green and blue. In the same volume of the Edinburgh Phil. Trans. 1822, at p. 455, Sir J. Herschel describes briefly the spectra of muriate of strontia, muriate of lime, chloride and nitrate of copper, and boracic acid. The same observer, in the article, Light, Encycl. Metrop. 1827, p. 438, says :—"Salts of soda give a copious and purely homogeneous yellow, of potash a beautiful pale violet." And he there gives a general statement of the results with the salts of lime, strontia, lithia, baryta, copper, and iron. He further continues,—"Of all salts the muriates succeed best, from their volatility. The same colours are exhibited also when any of the salts in question are put in powder into the wick of a spirit lamp. If however salt be used, Mr. Talbot has shown that the light is an absolutely homogeneous yellow. . . . . The colours thus communicated by the different bases to flame, afford in many cases a ready and *neat way of detecting extremely minute quantities of them.* . . . . The pure earths when violently heated, as has recently been practised by Lieutenant Drummond, by directing on small spheres of them the flames of several spirit lamps, urged by oxygen gas, yield from their surfaces lights of extraordinary splendour, which when examined by prismatic analysis, are found to possess the peculiar definite rays in excess, which characterize the tints of flames coloured by them, so that there can be no doubt that these tints arise from the molecules of the colouring matter reduced to vapour, and held in a state of violent ignition."

The analysis of the spectra of artificial lights was resumed by Mr. Fox Talbot, who published a paper in 1826, in vol. v. of 'Brewster's Journal of Science.' He there describes a method of obtaining a yellow monochromatic light by the use of an ordinary spirit lamp with a cotton wick fed with dilute alcohol holding common salt in solution. He found the same effect whether muriate, sulphate, or carbonate of soda were employed.

Nitrate, sulphate, chlorate, and carbonate of potash, agreed in giving a bluish-white tinge to the flame. By burning a mixture of nitre and sulphur, he observed a red ray of low but definite refrangibility, which he regarded as characteristic of the salts of potash, as the yellow ray is of the salts of soda. He concludes his paper with the following observation, which follows some remarks upon some experiments of Herschel's:—"If this opinion should be correct and applicable to the other definite rays, *a glance at the prismatic spectrum of a flame may show it to contain substances which it would otherwise require a laborious chemical analysis to effect.*"

In the Phil. Mag. for 1834, vol. iv. p. 114, Mr. Talbot further showed how, notwithstanding the similarity in colour of the light of lithia and strontia, they can at once be distinguished by means of the prism. He says the strontia flame exhibits a great number of red rays, well separated from each other by dark intervals, not to mention an orange and a very definite bright blue ray. The lithia exhibits one single red ray. Hence *I hesitate not to say that optical analysis can distinguish the minutest portions of these two substances from each other with as much certainty, if not more, than any other known method.* He then describes the spectrum produced by the flame of cyanogen.

In a paper, in vol. ix. of the same journal, p. 3, (1836), Mr. Talbot again adverts to the importance of the study of coloured flames, and describes the spectra of the salts of copper, of boracic acid, and nitrate of baryta, and corroborates by independent experiment the observations of Wheatstone on the Electric Spark.

The spectra of coloured flames were further examined in 1845, by myself, and an account of these experiments was given in a paper read that year before the Chemical Section of the British Association, at Cambridge (Phil. Mag. xxvii. 81).

An alcohol lamp, fed with a solution of the compound the flame of which was to be examined, and a common wick supported in a small glass tube, furnished the flame. The lamp was placed opposite the vertical slit through which diffused daylight could be transmitted at pleasure. Fraunhofer's lines thus served as points of comparison of the different flames. The paper was illustrated by coloured lithographs of various spectra, the first that were published, including those of chloride of copper, boracic acid, nitrate of strontia, chloride of calcium, and chloride of barium in minute detail.

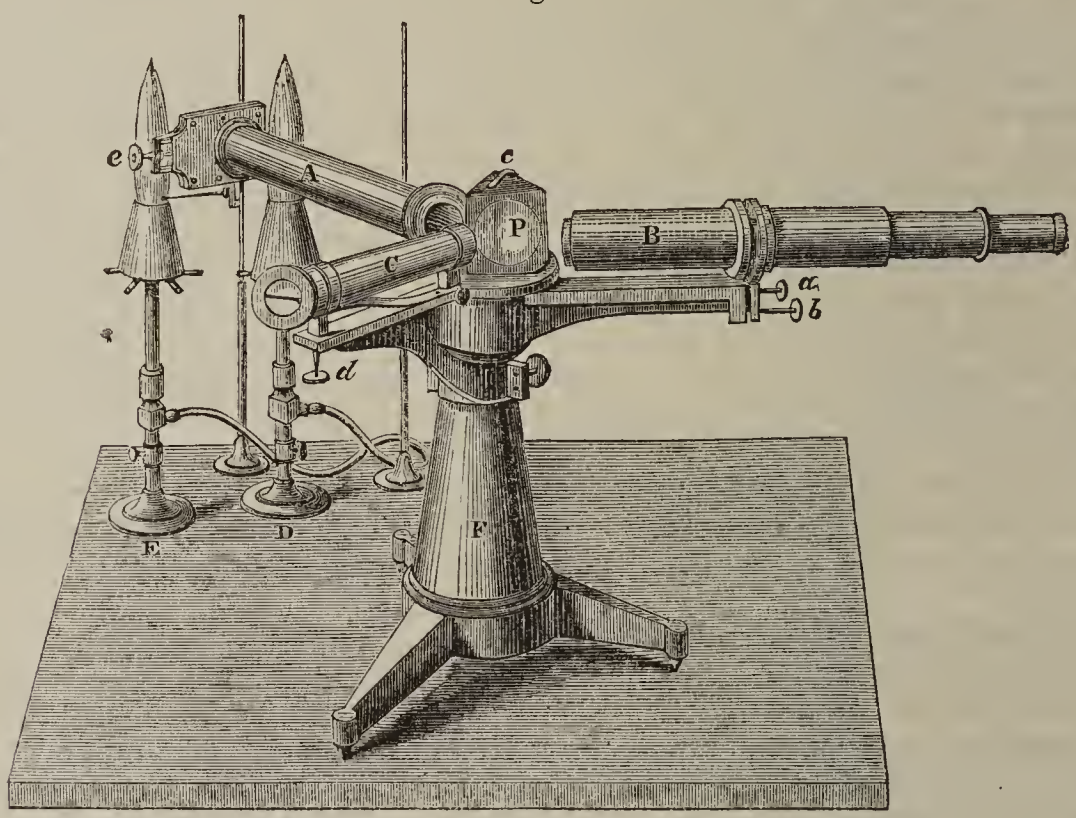
Numerous other spectra were also described, including those of the chloride of sodium, manganese, and mercury, and of a large number of other metals. The paper concludes with the observation:—"It may be interesting to remark, in connection with the speculations on the absorptive action of the sun's atmosphere, that if solar light be transmitted through a flame exhibiting well-marked black lines, these lines re-appear in the compound spectrum, provided the light of day be not too intense compared with that of the coloured flame. This may be seen in the red light of the nitrate of strontia, and less perfectly in the green of the chloride of copper. It would therefore appear that luminous atmospheres exist in which not only certain rays are wanting, but which exercise a positive absorptive influence on other lights."

The next paper of importance upon the prismatic analysis of artificial lights were published by Mr. Swan, in 1857. He, as early as the year 1847 (Edinburgh Phil. Trans.), in examining the double refraction of Iceland spar, pointed

out the convenience of employing the principle of the collimator, which enables the slit through which the light is allowed to fall upon the prism, to be brought up to within a very short distance of the prism itself. And in 1857 (Ed. Phil. Trans. vol. xxi. p. 411), in the course of an elaborate investigation of the prismatic spectra of the flames of compounds of carbon and hydrogen, he indicated the extreme delicacy of the reaction for sodium. The yellow bright line characteristic of this metal he found could be produced by a quantity of a solution of common salt, which did not contain more than $\frac{1}{2500000}$ of a grain of sodium.

But it is to Kirchhoff and Bunsen (Poggendorff's Annal. cx. p. 161) that we are indebted for reducing the prismatic observation of flame tinged by the salts of different metals to a simple and systematic method of analysis for the alkalies and alkaline earths; and they have contrived an apparatus, of comparatively simple construction, by which the different spectra may be conveniently examined, and compared with one another. The subjoined figure (Fig. 1)

Fig. 1.



exhibits the instrument in its most complete form (Poggendorff's Annal. cxiii. 374). It is an improvement on the instrument used by Swan and by Masson; including a scale for ascertaining the position of the lines in different cases, as well as a reflecting prism, by which two spectra can be compared side by side. P represents a flint-glass prism, supported on the cast-iron tripod F, and retained in its place by the spring *c*. At the end of the tube, A, nearest the prism, is a lens, placed at the distance of its focus for parallel rays from a vertical slit at the other end of the tube. The width of the slit can be regulated by means of the screw *e*. One-half of this slit is covered by a small rectangular prism designed to reflect the rays proceeding from the source of light D, down the axis of the tube, whilst the rays from the source of light E, pass directly down the tube. By this arrangement the observer stationed at the end of the telescope B, is able to compare the spectra of both lights, which are seen one above the other, and he can at once decide whether their lines coincide or differ. *a* and *b* are screws for adjusting the axis of the telescope so as to bring any part of the slit at *e* into the centre

of the field of vision. The telescope, as well as the tube C, is movable in a horizontal plane, around the axis of the tripod. The tube C contains a lens at the end next to the prism, and at the other end is a scale divided into millimètres. When the telescope has been properly adjusted to the examination of the spectrum, the tube C is moved until it is placed at such an angle with the telescope and the face of the prism, that when a light is transmitted through the scale, the image of this scale is reflected into the telescope from the face of the prism nearest the observer. This image is rendered perfectly distinct by pushing in the tube which holds the scale nearer to the lens in C, or withdrawing it to a greater distance, as may be required. The lines of the scale can then be employed for reading off the position of the bright or dark lines of the spectrum, as both will appear simultaneously, over-lapping each other, in the field of the telescope. By turning the tube C round upon the axis of the tripod, any particular line of the scale can be brought to coincidence with any desired line of the spectrum. Stray light is excluded by covering the stand, the prism, and the ends of the tubes adjoining it with a loose black cloth.

The extraordinary delicacy of certain of these spectrum reactions was indicated by Swan, who measured it for sodium, by the only accurate method, namely, by dissolving a weighed quantity of the salt in a known quantity of water, and he thus determined with precision the limit of the reaction. Bunsen and Kirchhoff attempted to estimate the sensitiveness of the reaction by deflagrating a given weight of the various salts in the room in which they were experimenting, and diffusing the vapour mechanically through the air, increasing the quantity of the salt, until a gas flame showed the reaction of the peculiar metal, due to particles in suspension. But it is obvious that this method does not admit of precision, and is liable to lead to an exaggerated estimate of the delicacy of the reaction, from the impossibility of ensuring uniformity in the diffusion of the salt.

The sodium reaction is the most sensitive of all; and so extensively is common salt diffused that scarcely any flame can be obtained in which the indication of soda is absent.

Having observed the position of the bright lines produced by introducing into the flame of a Bunsen gas-burner the salts of the various alkalies and alkaline earths, each of which had been purified for these experiments with great care, they constructed a chart in which the different lines were laid down for each, and were able, by observing the position of the lines obtained when a mixture of various salts was introduced into the flame, to ascertain the presence of these different bases with sufficient readiness to use the method for the purposes of qualitative analysis. The rapidity with which the result is obtained by a practised observer, and the minuteness of the quantity required for the examination, give this method a superiority over any other now in use for the qualitative analysis for the alkalies and alkaline earths; moreover, the circumstance that the mere inspection of a source of light furnishes information respecting the composition of the bodies undergoing combustion or volatilization, extends the mode of inquiry over distances limited only by the distance through which the object is visible; we are thus furnished with a method of analysis which is applicable to the luminous atmosphere of the sun, the stars, as well as to the light of the planetary bodies. This circumstance invests the subject with an interest like that which attends the employment of the telescope; at the same time the minuteness of its search enables it to reveal, like the microscope, quantities of matter indefinitely small.

This minuteness in its scrutiny has already, in the hands of Bunsen and Kirchhoff, led to the discovery that many bodies, such as lithia and strontia, formerly supposed to be rare, are really widely distributed in minute quan-

tities. It also led them to discover the two new alkalies *cæsia* and *rubidia*, the first named from *cæsius*, "sky-coloured," in allusion to two characteristic blue lines in its spectrum; the second from *rubidus*, "dark red," owing to the existence in its spectrum of two red lines of remarkably low refrangibility.

These bases were found in the course of an examination by the prism of the residue of the mother-liquor from the Durkheim spring, when the occurrence of these hitherto unobserved lines induced Bunsen to make a minute chemical examination of the water which furnished them. The inquiry showed that in every ton of the original water, about three grains of chloride of cæsium, and rather less than four grains of chloride of rubidium, were present. These two salts so closely resemble chloride of potassium in properties, that it would have been impossible to have ascertained their existence in the minute proportion in which they occur but for the method of spectrum analysis.*

Kirchhoff and Bunsen ignited many of the salts of the different metals in flames of very varying temperature, including those of sulphur, bisulphide of carbon, diluted alcohol, carbonic oxide, hydrogen, and the oxyhydrogen mixture, and they found that the same metal always produced the same lines whatever flame they employed to heat it.

They do not, however, appear to have observed that, as the temperature rises, a new series of bands become visible in certain cases. The spectrum of chloride of lithium, in the flame of a Bunsen burner, gives but a single intense crimson line; in a hotter flame, as that of hydrogen, it gives an additional orange ray; and in the oxyhydrogen jet, or the voltaic arc, a broad brilliant blue band comes out in addition. A similar effect is perceived in the case of metallic iron and other metals when heated by the voltaic arc, which at elevated temperatures furnish much more complicated spectra than when less intensely heated.

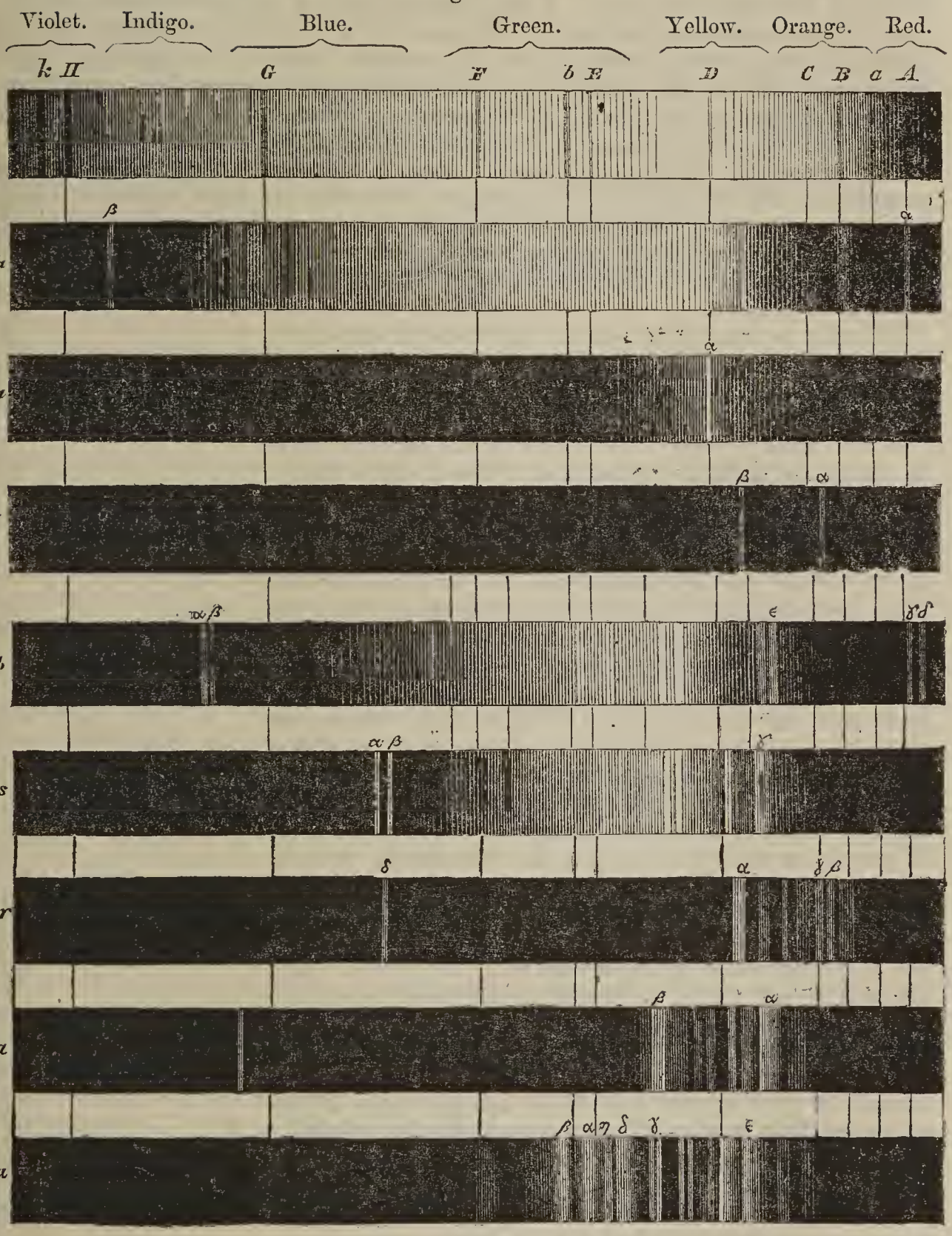
The first spectrum shown in the figure on the next page exhibits some of the fixed dark lines of the solar spectrum contrasted with the position of some of the most important bright lines furnished by the spectra of the alkalies and alkaline earths, when their salts are heated upon a loop of platinum wire introduced into the flame of a Bunsen gas-burner. The characteristic lines in each case are distinguished by the letters of the Greek alphabet, the most strongly marked lines being those indicated by the earliest letter.

Amongst the various spectra, those of the alkalies are the simplest. In the potassium spectrum the most characteristic bands are the red band Ka α, and violet band, Ka β. A copious diffused light fills up the central portion of the spectrum. In the sodium spectrum nearly the whole of the light is concentrated on the intense yellow band Na α. In the lithium spectrum a crimson band, Li α, is the prominent line; Li β is seldom visible; but at the elevated temperature of the voltaic arc, an additional blue line becomes very intense.

In the spectrum of cæsium a good deal of diffused light is visible, but the two lines in the blue, Cs α and Cs β, are strongly marked, and may be seen when a quantity of the chloride not exceeding $\frac{1}{170000}$ of a grain of the pure

* Bunsen and Kirchhoff found their method of separating potassium from rubidium and cæsium upon the difference in solubility of the double salts which the chlorides of potassium, rubidium, and cæsium, form with bichloride of platinum. Boiling water takes up 5·18 per cent. of the potassium salt ($KCl,PtCl_2$), 0·634 of the rubidium salt ($RbCl,PtCl_2$), and only 0·377 of the cæsium salt ($CsCl,PtCl_2$). The cæsia and rubidia may be separated by taking advantage of the solubility of carbonate of cæsia in absolute alcohol, carbonate of rubidia not being soluble in this menstruum. The hydrates of potash, rubidia, and cæsia are all deliquescent, and absorb carbonic acid from the air; they give crystalline precipitates with tartaric acid, and an opalescent precipitate with fluosilicic acid. The chemical equivalents of the three metals are as follows:—potassium, 39·1; rubidium, 85·36; cæsium, 123·35.

Fig. 2.



salt is used, or $\frac{1}{7000}$th of a grain if diluted with fifteen hundred times its weight of chloride of lithium. Rubidium is not distinguishable in quantities quite so minute. The lines Rb a and Rb β, in the red, and Rb γ in the blue, are almost equally characteristic, but about $\frac{1}{33000}$th of a grain of the chloride is required to render them visible. The spectra of the alkaline earths are equally definite though more complicated.

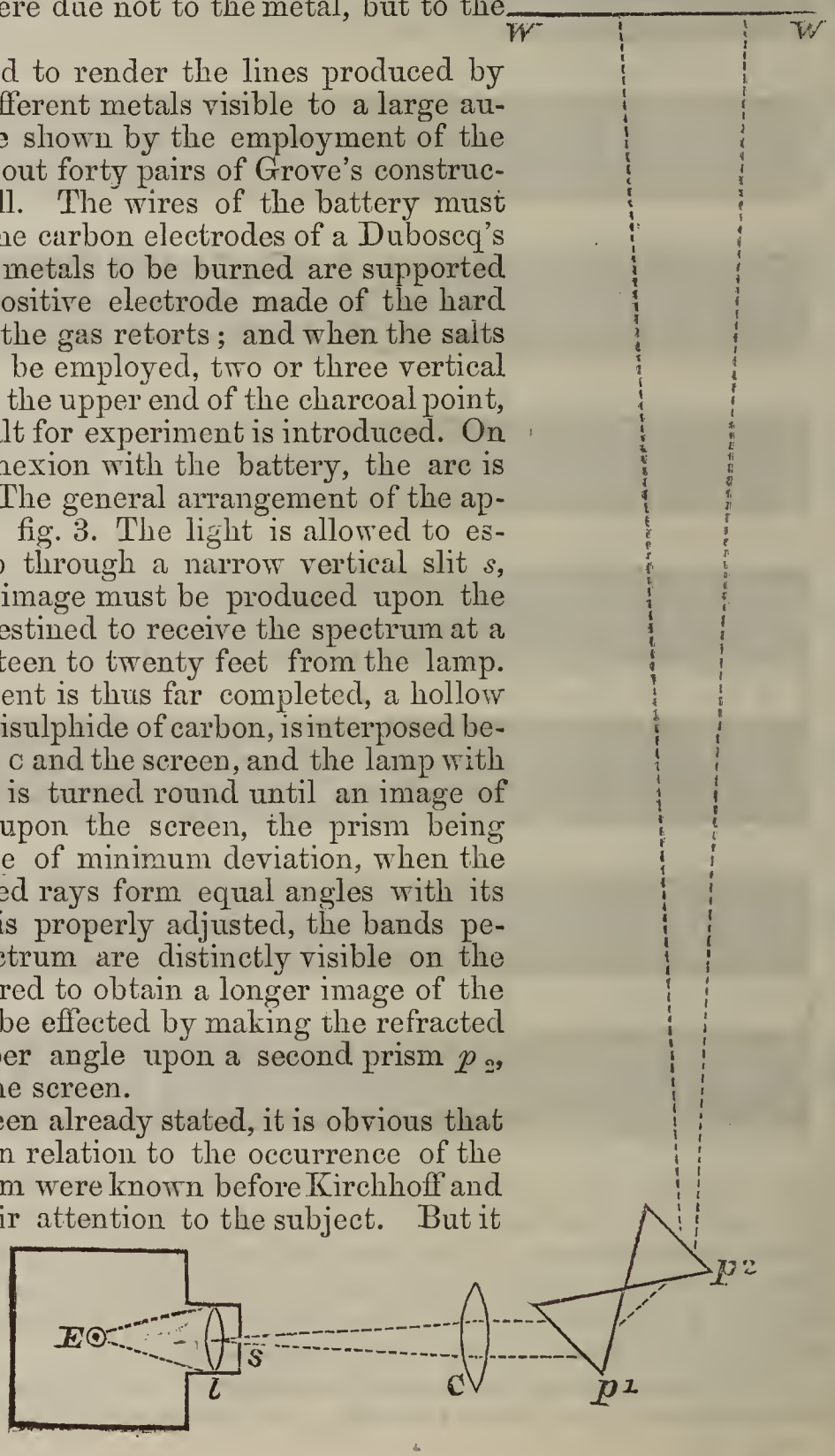
The salts which are most readily volatilized, such as the chlorides, bromides, and iodides of the different metals, give the most brilliant spectra. But it is

only in the case of the alkalies and the alkaline earths that the spectra thus obtained are characteristic. Where the spectra of the other metals are required, recourse must be had to Wheatstone's method of taking electric sparks, between wires consisting of the metal of which the spectrum is required, and the electric sparks may conveniently be procured by the employment of Ruhmkorff's coil. The temperature obtained in this way is very intense, and developes lines not produced by the heat of ordinary flames.

If photographs of these spectra be taken, I have found that the impression obtained in atmospheric air or in nitrogen is nearly the same whatever metal be employed; but if the spark be passed in hydrogen, or in carbonic acid, all the extra-violet lines disappear, proving that these lines of the photograph were due not to the metal, but to the nitrogen of the air.

When it is desired to render the lines produced by the spectra from different metals visible to a large audience, they may be shown by the employment of the voltaic battery. About forty pairs of Grove's construction will answer well. The wires of the battery must be connected with the carbon electrodes of a Duboscq's electric lamp. The metals to be burned are supported upon the lower or positive electrode made of the hard carbon deposited in the gas retorts; and when the salts of the metals are to be employed, two or three vertical holes are drilled into the upper end of the charcoal point, and into these the salt for experiment is introduced. On completing the connexion with the battery, the arc is produced as usual. The general arrangement of the apparatus is shown in fig. 3. The light is allowed to escape from the lamp through a narrow vertical slit *s*, of which a distinct image must be produced upon the white screen w w, destined to receive the spectrum at a distance of from fifteen to twenty feet from the lamp. When the arrangement is thus far completed, a hollow prism p_1, filled with bisulphide of carbon, is interposed between the condenser c and the screen, and the lamp with the condensing lens is turned round until an image of the spectrum falls upon the screen, the prism being brought to the angle of minimum deviation, when the incident and refracted rays form equal angles with its faces. When this is properly adjusted, the bands peculiar to each spectrum are distinctly visible on the screen. If it be desired to obtain a longer image of the spectrum, this may be effected by making the refracted rays fall at the proper angle upon a second prism p_2, before they reach the screen.

Fig. 3.



From what has been already stated, it is obvious that the principal facts in relation to the occurrence of the bands of the spectrum were known before Kirchhoff and Bunsen directed their attention to the subject. But it has been invested with a new interest by the discovery of the new bases cæsia and rubidia, and particularly by a

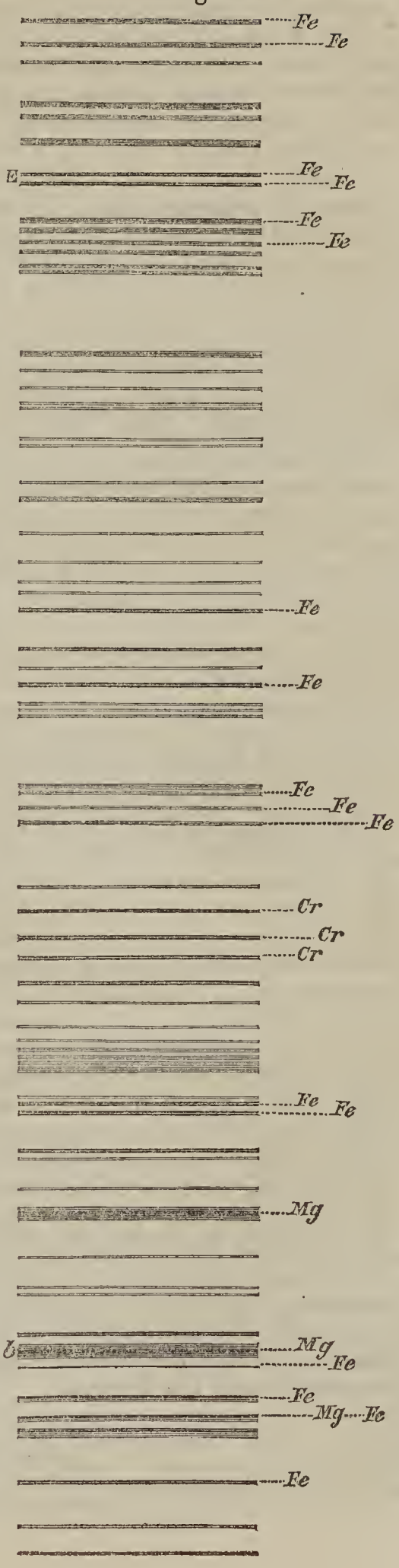
theory of Kirchhoff's which embraces and generalizes the greater number of the phenomena, though it does not account for all of them. This theory we shall now consider.

It is to be remembered that the spectrum produced by the ignition of a solid or of a liquid always yields a continuous band of light, containing rays of all degrees of refrangibility within the range of its two extremes: but the same body, when converted into vapour, may produce a luminous atmosphere which may emit light of certain definite refrangibilities only, so as to produce a spectrum consisting of a series of bright bands of particular colours, separated from each other by intervals more or less completely dark. Bearing these facts in mind, the theory proposed to account for Fraunhofer's lines, will be readily understood.

In 1858, Mr. Balfour Stewart published in the 'Edinburgh Phil. Trans.,' vol. xxii., a paper on the law of exchanges in radiant heat, and in the following year the subject was taken up by Kirchhoff, who arrived at the same conclusions as Mr. Stewart, independently; and the German philosopher extended his theory to the phenomena of light as well as those of heat. The conclusion at which he arrived may be thus stated,—That when any substance is heated or is rendered luminous, rays of a certain and definite degree of refrangibility are given out by it; whilst the same substance has also the power of absorbing rays of this identical refrangibility.

Sodium for example, when ignited, emits an intensely brilliant yellow light which is concentrated into two closely contiguous bands or bright lines coincident in position with Fraunhofer's double black line D in the solar spectrum. But if through the flame coloured by sodium, the more powerful light of the charcoal points or ignited lime be transmitted, the continuous spectrum due to this stronger source of light is interrupted by a *black* line coincident with the solar black line D. Kirchhoff has also ascertained that certain of the bright bands in the spectra of potassium, lithium, barium, and strontium, may in like manner be re-

Fig. 4.*



* Want of space obliges the figure to be arranged vertically instead of across the page. The upper extremity is the least refrangible end.

versed, and I have found that some of the strongest lines in the blue in the spectrum of copper may be reversed in like manner.

Now Kirchhoff has applied these facts to the explanation of Fraunhofer's dark lines. He supposes that in the luminous atmosphere of the sun, the vapours of various metals are present, each of which would give its characteristic system of bright lines; but behind this incandescent atmosphere containing metallic vapour, is the still more intensely heated solid nucleus of the sun, which emits a brilliant continuous spectrum containing rays of all degrees of refrangibility. When the light of this intensely heated nucleus is transmitted through the incandescent photosphere of the sun, the bright lines which would be produced by the photosphere *are reversed*, and Fraunhofer's black lines are only the reversed bright lines which would be visible if the intensely heated nucleus were no longer there.

Kirchhoff has proceeded to test this theory by submitting the solar spectrum to a still more minute investigation than Fraunhofer, or even than Brewster and Gladstone, who have recently mapped more than two thousand of the dark lines. (Phil. Trans. 1860.)

The diagram on the preceding page shows a small portion of Kirchhoff's detailed drawing, including the part of the spectrum extending from E to *b* (fig. 4), and he states that for every bright line in the spectrum of iron is a corresponding black line in the solar spectrum. Seventy such lines occur between D and F, and in the small portion contained in the figure there are seventeen such lines indicated by the mark *Fe*. The strong lines near *b*, marked *Mg*, coincide with the brilliant green lines in the spectrum of magnesium. Chromium and nickel also give less distinctly marked lines, indicated in the case of chromium by the letters *Cr*.

Kirchhoff, from these and other more extended observations, draws the conclusion that in the atmosphere of the sun the vapours of sodium, potassium, magnesium, iron, chromium, and nickel are present; but that lithium, aluminum, zinc, cobalt, copper, and silver are not present.

Fascinating as this theory is, it must be remembered that it is yet upon its trial, and that it does not explain the facts at present known respecting the vapours of hydrogen, mercury, chlorine, bromine, iodine, and nitrogen. M. Morren even questions the accuracy of some of Kirchhoff's observations. Thus, he states that in a measurement which he made of the red band of potassium conjointly with Plücker, they found that it did not correspond with the solar line A, but that it is considerably more refrangible. (Chem. News, Dec. 7, 302.)

The present occasion, however, is not the most appropriate for discussing these and other points which still require careful experimental elucidation; yet it seems to be not unfitting at the present moment to put some ardent minds upon their guard; for it appears by some to have been hastily assumed that we already have the key to everything upon this subject. A possible way to new truth has indeed been opened: here, doubtless, as in all other cases where we are permitted to obtain a further glimpse into the machinery of the universe, we shall but see fresh proofs of exhaustless wisdom on the part of the great Author of nature. Instead of boasting of our triumphs, we shall, if we pursue our researches in a right spirit, be taught a lesson of reverent humility as we are allowed to raise a fresh corner of the veil which separates that which is known to man from the infinitely greater portion which still lies beyond.

PHARMACEUTICAL SOCIETY, EDINBURGH.

The second scientific meeting for the present Session, postponed in consequence of the death of the Prince Consort, took place in George Street Hall, on Thursday evening, the 9th of January, at nine o'clock. There was a good attendance,

MR. AINSLIE, PRESIDENT, IN THE CHAIR.

Mr. JOHN GAMGEE, Principal of the New Veterinary College, Edinburgh, having been introduced to the meeting, read the following communication on "The Influence of the Study of Comparative Therapeutics on the progress of Pharmacy:"—

Mr. President and Gentlemen,—The subject which I venture to enter upon this evening is one vast and important, which would demand far higher mental power, attainments, and leisure, than it is my lot to bestow on it. Its choice has been very natural to me from its direct bearing on my professional duties, though hazardous, inasmuch as there is some danger of tiring your patience, and not adding a single new idea to the many which men of learning have expressed in their writings and erudite discourses. I shall feel satisfied if I succeed in pointing to the practical value of one great branch of medical science, neglected, to a great extent, for the past, but promising a rich harvest in future. A branch, for the cultivation of which opportunities have lacked, and which is likely to accelerate the progress of that rational empiricism which the illustrious Humboldt justly indicated as the origin of the use of medicines in the treatment of disease.

Addressing many whose daily duties are too frequently regarded as purely mercantile, I have to re-echo a sentiment which has often sounded in this hall, that as pharmacy can materially aid the progress of medicine, the enlightened pharmaceutist must be a man of extensive scientific acquirements, and must co-operate in the labours of all who aim at perfecting the healing art. It is not the neatness and dispatch with which the duties of the counter can be fulfilled, that has raised British pharmacy to its present position, but the profound thought, and infinite pains brought to bear on original investigations in preparing medicines of the greatest purity, greatest strength, and consequently greatest efficacy, that can be placed in the hands of the medical practitioner to combat disease.

Some will object to the expression "combat disease." No person is more sensible of how unequally foes are matched, when the doctor advances armed with his drugs against disease which steals onwards under the shelter of that impenetrable thicket, to be named "Where there is life there is hope." Random volleys of physic destroy that sure ambuscade—vital reaction—and death sternly asserts its victory.

The days are gone when twenty drugs were mixed up in a draught or pill mass, and each separate agent was supposed to overpower one of the many morbid actions peculiar to the disease prescribed for. There are some in this room who could paint a mighty picture of the changes in the aspect of their trade within the last fifty years, and all to be accounted for by progress in science. We deal both too much and too little in physic now. The sooner the pharmaceutical chemist knows when matters are to reach their proper level the better; but I fear, for ages to come, we shall find the disciples of the expectant method practising side by side with the leaders of fashion in matters of prescription. As medicine can never attain the position of an exact science, pharmacy must, I fear, content itself with great uncertainties as to what will be wanted next.

Nevertheless, who will doubt the benefit of increasing our knowledge by every available means, that we may approach, as rapidly as possible, the great generalizations that are destined to simplify the duties of the doctor as they are likely to lead to a more rational reliance on the efficacy of drugs? It is a fact well known amongst the practitioners of both human and veterinary medicine, that in their earl days of professional life they prescribed with far greater faith than as they grew older. The exact limits indicated for the use of medicines by the history of their separate kinds and classes, appear to become obscure and uncertain, and an acquired dread of unnecessary

interference leads to the use of a tisane instead of calomel and opium. With age the prescriber believes more and more with Galen, that the prescription of a medicine is under control, but its effects are not.

But I do believe, that as there are those who this day prescribe for many diseases with marvellous good effect and equally marvellous certainty, so will the knowledge of diseases and scientific attainments of men increase and add largely to the list of rational and efficacious prescriptions.

In order to accomplish this very desirable object, the science of therapeutics must be prosecuted with the aid of that universal observation which led Oken to stop on seeing the bleached skull of a deer, and exclaim, "That head is but a row of vertebræ," and thus to lay the foundation of philosophical anatomy. The same system must be followed out that suggested Owen's generalizations as to the typical forms of animals, or Goodsir's remarkable, and, I believe, accurate in fact if not in word, revelations on cell life, and centres of nutrition. The comparative anatomist dissects a frog, a scorpion, or a zoophyte, with as much earnestness, delight, and profit, as he dissects a man. The smaller the part, the simpler the structure, the nearer he finds himself to the ultimate forms of animate matter, and though, armed with a comprehensive knowledge of physiology, he fails to answer what is life, yet he determines what is the simplest entity capable of living.

It may be thought that I am taking a flight beyond my subject, and digressing far, but such is really not the case. If we refer to the origin of the healing art, or to the discovery of individual medicines, we shall find that the same simple observations or experiments were performed as those of the anatomist in laying the foundation of his science. But in treating the diseases of man, it is, unfortunately, too difficult to see, or rather to perceive, either the nature of the malady or the operation of the medicine. Add to the most complex and most highly endowed of organizations the influence of high mental cultivation, or the opposite of mental corruption, and you must have great difficulty in tracing the simple deviations from the healthy state in the mysterious diseases to which our flesh is heir. Study the reproduction of a salamander's leg, or the changes of tissue in inflammation in the frog and bat, and you can appreciate much that is positive fact, and with that light further experiments suggest themselves, and much information is obtained regarding inflammation and reparation in man.

Most of us here assembled have witnessed that greatest of all recent revolutions in therapeutics by which pharmacy has gained much, and which has resulted in the almost total extinction of the practice of blood-letting. It is true that the abuse of the lancet and physic has led to many species of quackery, including the All-my-eye-opathy, as 'Punch' would call it, of the disciples of Hannemann; but we cannot have better instance than that of venesection to prove the difficulty of determining the precise operation of remedies as affecting the human frame. How much has been said, and yet how vaguely! The general result is condemnatory of the practice, though that is only arrived at by very dear-bought experience rather than from philosophical induction.

Some of the orthodox practitioners, led on by Dr. Todd, not only have arrived at avoiding blood-letting, but employ stimulants largely in the treatment of inflammatory disease. They are apparently successful, and it is well-established, that when the system has become inured to alcohol by constant habit, alcohol is required during an attack of prostrating disease. Yet alcohol is not, and cannot be maintained to be, by its strongest supporters, an antiphlogistic—an agent opposed to the cause, and adverse to the very existence of inflammation. Its chief use appears to be to enable the system to bear up against the disease. The constitution of the wine, spirit, or beer drinker is a bad one to observe the operation of medicines on, and in establishing the fundamental truths of the science we must prefer animals, as little susceptible of artificial existences, as they are little prone to feign disease and to fancy themselves benefited by a drug taken with faith in the prescriber.

Open that profound work of the immortal Pereira, study the writings of all the great contributors to the science of pharmacy, and you find that in establishing the operation, use, and even doses of drugs, the lower animals have been experimented on in health; but though you will find occasionally the names of Moiroud, Delafond, Lassaigne, Hertwig, and of one or two more distinguished veterinarians, as authorities on

the action of certain drugs, yet you cannot but be struck at the almost total absence of information regarding the remedial effects of medicine on sick animals. Not only has it been acknowledged that disease singularly affects the operation of medicines, but also that their effects on healthy subjects do not indicate their use in the treatment of disease.

Rather than experiment, as is the daily practice, on suffering humanity, it is surely time that special attention were paid to observations on suffering animals. I am aware of the many objections to be started; but until we get the science of Comparative Pathology and Comparative Therapeutics as much recognized in our universities as the sciences of Comparative Anatomy and Physiology, we cannot hope for that perfect elucidation of many leading topics in medicine which are calculated to correct the defects and clear away the uncertainties of the art of physic of the present day.

We must not forget, however, that the study of comparative therapeutics requires similar provisions to those made for the study of human medicine. Sick animals must be seen daily, hourly, and in large numbers, so that whereas it is probable that in a man of medical education, the value of comparative medicine will be more insisted on in future, the real centres for such study are our veterinary colleges. Scotland must accomplish her share in the great work—a work which can only commence when an infirmary for sick animals is established, and a well organized clinique, on the footing of the French or German veterinary schools. Materia Medica has been regarded in British veterinary colleges as a very secondary subject; and with all due respect for the able chemists who have taught it hitherto, I venture to believe that without a special veterinary training, and the opportunities of a veterinary practice, no person can fit himself for lectures on Veterinary Materia Medica.

I certainly think that the late lecturer on Chemistry and Materia Medica in the London Veterinary College, accomplished much, and induced many to improve on the dirty and dangerous system of dispensing, which is still in full vogue where it would be least expected. The very manner in which the compounding and prescription of drugs is carried on, indicates a total lack of a sense of their true value. We have not yet passed the period when it is thought that horse-physic, cow-drenches, and dog-drugs need not be as pure and as carefully compounded as the medicines ordered by the physician. This is not a little astonishing, as the veterinary profession has not attained the age of specialists. They are all general practitioners, and all dispensers of drugs. Their pecuniary interests are therefore involved in properly conducting a pharmacy, and our colleges must be provided with suitable pharmaceutical laboratories, which are to be found on a style worthy of the cause for which they are instituted in the school at Alfort, so long honoured by the learned and indefatigable Lassaigne, or the one in Berlin, famed for the *facile princeps* of veterinary therapeutists, Carl Heinrich Hertwig.

It is not, however, my object this evening to turn your attention to veterinary colleges, but simply to indicate that there is a vast fund of information to be contributed to the general stock of therapeutical science, and to be derived from an enlightened study of the effects of medicines on the lower animals. Far be it from me to recommend sweeping analogies. The opium which the human physician and surgeon may use with unsparing hand is, in my opinion, too often rank poison for the horse tribe. The tartar emetic so potent in man, so useful—not as a racking emetic as too often abused, but as an admirable febrifuge and expectorant in the dog, is utterly valueless in the larger herbivora. Nevertheless, much that is false in human therapeutics might be corrected by a thorough investigation of the peculiar operation of drugs on animals in general; and notwithstanding a few exceptions, these would only point to the essence of many phenomena, and help to lay the foundation for invaluable generalizations.

The importance of individual facts cannot be over-estimated, and it is only by a number, without limit, of such individual facts, that we can hope to establish that certain practice in the treatment of disease which is the very blood and bone of pharmacy. But the way to ascertain these facts merits a share of our attention. It is admitted, though not without a dissentient voice, that the effects of medicines cannot be predicted before their extensive trial under an infinite variety of circumstances; as experience is therefore our only guide in practice, so does it behove the pharmaceutical chemist to employ his means in preparing that which he believes may be beneficial, and

then submit it, not to the limited observation of the human physician alone, but to all who can watch his preparations in the treatment of disease.

The circumstance, that veterinarians are not likely to send any prescriptions to pharmaceutical chemists, will doubtless tend for long to limit the intercourse of great value between the members of the two professions; but the prosecutors of original research are ever meeting with each other indirectly if not directly, and mutually assisting each other by the publication of results.

I am glad to find that it is proposed to render the 'Pharmaceutical Journal' a more suggestive medium than it has been hitherto. I trust that the members of this Society will lose more and more that reserve which is almost a matter of the past in the medical profession, and which retards the progress of pharmaceutical science,—a reserve due to the desire of deriving pecuniary benefit from preparations which may accidentally be discovered. Though it is impossible that, as medicine vendors, they can refuse to keep the many secret proprietary medicines, which yield a handsome return, nevertheless they can advance their science by original research, the publication of any improvements or discoveries made, and thus contribute to the common good. It is only a false and narrow-minded policy which suggests a different line of conduct.

I have an intense hatred of quackery, and consider it utterly incompatible with the progress of science and the improvement of the human mind. Such a truism need not, perhaps, be mentioned here, but I believe the best friends of the Pharmaceutical Society can point to many very desirable steps which might be taken in order to counteract the reckless tampering with human life by potent poisons or useless drugs. The unfortunate tardiness with which a knowledge of the diseases of the lower animals has been disseminated over this country, and the dangerous character of the many cheap veterinary publications, almost without exception, that are pressed before the public by country booksellers, have led to a number of worthless compounds being prepared by the regular chemist, amateur, and not a few professional veterinarians, that are far more deadly in their effects than the diseases for which they are administered.

I am aware in what light the dispenser, who undertakes to prescribe, is viewed by the judicious members of this society, but it is impossible, especially in remote country districts, that the aid of medicine should be refused under special circumstances, such as in the absence of those qualified to treat disease. Not only does this render it indispensable that the fundamental principles of therapeutics be known to the pharmaceutical chemist, but his constant familiarity with medicines, in all forms and combinations, renders him often fit to discriminate their application, and even to afford valuable aid to the practitioner himself. But when, from total ignorance of the constitution of animals, either in health or disease, and provided only with the very scanty knowledge of veterinary pharmacy he can at the present day acquire from many British veterinary works, the chemist compounds a number of colic draughts, distemper balls, potent liniments, burning oils, and a host of other deadly preparations, we cannot help but deplore his ignorance,—an ignorance unfortunately too common amongst numbers of our own profession, and therefore not surprising amongst those who attempt to supply a public want under circumstances more disadvantageous.

I wish for the earnest co-operation of the enlightened pharmaceutist, in furthering the progress of an universal medicine. I know how difficult it is for him to find a helping hand, but in one way, I think in a few more years, most important results may be obtained. I have mentioned how important it is that pharmaceutical laboratories be established in our veterinary colleges, but probably we shall never attain to that perfect system of training our students in pharmacy, that is offered by the officers of pharmaceutical assistants over the whole country, under the superintendence of enlightened pharmaceutical chemists. The veterinary art, essentially scientific in its basis, and affording the most alluring prospects, not only for the lovers of animals, but to original thinkers, and, indeed, to the most elevated minds must attract to its study many of those who have devoted much time to practical pharmacy, amongst the crowd of pharmaceutical assistants, and from which the medical profession derives many worthy members.

I am well persuaded that if, instead of our veterinary colleges sending out, as they have done, under a system of the worst routine, a number of young men annually, who have just crammed the simplest rudiments of science, they will encourage all who can

extend their course of education; and if they will furnish means for the advancement of science within their walls, we shall soon have veterinarians holding a more useful position in society. Thus we may expect the rapid strides yet to be made in comparative therapeutics; encouragement would be given to the development of an all-useful, though special department of pharmacy, and, however indirectly, this very Society would derive a material benefit.

It is only those of contracted minds who cannot perceive the potent influence of addition to our stock of knowledge in sciences, which do not appear immediately to bear on their own profession, yet I think few would be found in the medical profession who doubt the necessity of an active movement in favour of comparative medicine. I trust that the subject may be viewed in the same light by distinguished members of this Association, and that, whilst not having the prospect of such an immediate benefit, as the earnest student of pathological science, they may yet take such an interest in the subject as to help in removing the obstacles, especially in the shape of ignorant prejudice, which have operated so injuriously for the past.

It is not easy to lay down any general rules which may be followed by the pharmaceutical chemist on the one hand, and the comparative pathologist on the other, whereby medical science, in the broadest acceptation of this term, may be benefited by their conjoint researches. Nevertheless, we are well aware that if any student of nature enters on original investigations, the outlets for his energy, and the employment of the best talents, are so numerous, that, in a long life-time, he tends rather to widen than contract the field of labour.

I may be permitted, as an example, to bring up a subject which has been constantly worked at, and with very decided benefit. I mean the prescription and compounding of ferruginous preparations. They are largely employed with safety and benefit by medical men and veterinarians. Yet how little, comparatively, did we know of the rules to guide our choice of them until the researches of Quevenne and a few others. We now understand why a large dose of sulphate of iron in solution should sicken, and not be attended with the beneficial results of a moderate quantity of an insoluble ferruginous preparation. I have seen a poor horse drugged with sulphate of iron until severe symptoms of indigestion set in; a mild purgative then had the effect of inducing superpurgation, and the animal discharged black fetid and fluid evacuations, never rallying, and thus poisoned by a most harmless medicine. Claude Bernard, by his interesting physiological experiments, has shown why carbonate of soda, supposed to be incompatible with the administration of iron, is really a useful combination, from the manner in which it stimulates gastric secretion. The pharmaceutical chemist might think that a preparation in solution would be more readily digested than when in an insoluble state, and that an alkali would rather neutralize the action of the gastric juice, but experiments conducted on the lower animals prove such *à priori* reasoning to be false.

The chemist can yet assist the therapeutist much by a study of the infinite number of ferruginous preparations, and the two must yet labour to assert the specific virtues of the iodide and chloride, phosphate and citrate, nitrate and arseniate, not to mention many more. The universal employment of large doses of sulphate of iron in the treatment of the diseases of the lower animals reminds me of the pails full of blue broth once so constantly employed in the London Veterinary College as a tonic, and especially as a specific in the treatment of glanders. That blue broth was a strong solution of sulphate of copper.

Many here can bear testimony to the capricious way in which iron, the best known of medicines, is prescribed, and can believe with me that the light to be thrown on its use in disease, from investigations on the lower animals, is still great. I think it would puzzle some of the most ingenious theorists to tell me why, of all preparations yet tried, the ferruginous seem to be by far the most valuable in the treatment of epizootic pleuro-pneumonia. I am convinced of this fact. I remember the days when, with great faith, and the greatest regularity, doses of creosote, the carbonate and acetate of ammonia, sulphuric acid, aconite, iodides, sedatives, expectorants, purgatives, and diuretics, were administered by me, and others whose practice I have observed, in the treatment of this dreaded disease. I have good reason to declare now that, in all cases where the malady has not led to too extensive disorganization of the lung

tissue, preparations of iron restore better than all other medicines; and, strange to say, they appear capable in many instances of arresting, to a marvellous extent, the spread of the disease. Pleuro-pneumonia is a most contagious fever; the thoracic complications are mere local manifestations, just as the small-pox pustule is but a local symptom of variolous fever; and it would appear that the prompt and judicious use of preparations of iron enable the system to throw off the poison without producing its local effects—without giving rise to, and indeed preventing, the slightest general disturbance; animals that have been surrounded by the contagion, and from amongst whom diseased ones have been removed at the moment of commencing a course of iron, without the adoption of other preventative measures, have resisted the malady. I refer to careful observations in large numbers, and must press this fact on the attention of therapeutists. I am quite sure that many physicians, who might suspect the early appearance of fever amongst a body of men, would never think of trying tonic iron as a preservative.

It is true that the external application of an astringent lotion, containing iron, has been suggested for inflammations of a specific type, such as erysipelas; but its internal use for general diseases characterised by local exudations has not been ventured upon, at all events to any extent. Anæmia, chlorosis, and similar conditions, are those alone for which many preparations of iron and other astringent tonics are administered internally.

I tender these crude observations only for what they are worth. I am sure of this, that they refer to a subject which will be better understood as the science of comparative therapeutics advances, and which is only very imperfectly understood at present.

Arsenic, again, is one of the highly reputed medicines recommended by some as of almost universal efficacy, and by others as a drug to be used with great caution. Its curative effects on the diseases of the lower animals have often struck me as most remarkable, and not readily explained. A horse, condemned as incurable for a nasal discharge and cough, probably the simple result of an old catarrh and bronchitis, may often be restored to perfect health by a course of arsenic. The pharmaceutical chemist would do well to suggest to veterinarians the best mode of dispensing such a remedy. I do not like the solid form, though I frequently prescribe powders containing carbonate of potash and arsenic, to be taken in a wet mash. The liquor arsenicalis is an inconvenient form, and should perhaps be made stronger than it usually is. It is already used by us without the superfluous lavender, as the smell of the latter is objectionable for the lower animals. I have occasionally given out the liquor arsenicalis in graduated bottles, but it is undoubtedly desirable to have the same soluble potassæ arsenitis in a convenient form, so as to give little trouble, and ensure safety in administration.

I feel that were I to permit myself to dive into the subject, this discussion would be prolonged beyond reasonable limits. I think my object of enforcing on my hearers that the study of comparative therapeutics may exert great influence on the progress of pharmacy, needs no tedious specialities. You are all so ready to appreciate small additions to our knowledge, that the positive creation of a science bearing so directly on your pursuits, cannot require my advocacy to ensure at your hands the acknowledgment of its importance.

The weight of responsibility presses on me personally. For several years I have complained that our veterinary colleges have not advanced the science I am now drawing your attention to. In the rules of the London College, published in 1793, we find the following:—"A medical experimental committee shall be chosen, who shall meet occasionally for the purpose of suggesting and making experiments, with a view to throw additional light on the animal economy, and to ascertain the effect of medicines upon different animals, to be procured for that particular purpose." That law, like many others, has been a dead letter since the founder of the St. Pancras College was gathered to his fathers. We have now, however, succeeded in calling together, in our new institution, a number of young students as large, and, I believe, larger than in other colleges; and with this excellent omen of future prosperity, I trust that, so far as it will lie in our power, the views of the first promoters of our science and art in these realms will be furthered here. I know the difficulties, but have great faith in constant effort, the active co-operation of many, and the support of all scientific men.

However wide apart may seem the labour of the pharmaceutist and the veterinarian —however distant at present the members of the medical profession from those of my own, and however difficult the task of homologating such discordant elements, I venture to believe that we can all work for one great object, offering prospects of equal benefit to all—the progress of universal medicine.

A special vote of thanks was tendered to Mr. Gamgee, for his interesting paper, by Mr. AITKEN, and responded to unanimously.

The PRESIDENT introduced a new eye-douche, by the Messrs. Gilbertson, of London, and showed the practical application of the instrument.

The meeting thereafter adjourned.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The fifth meeting of the Thirteenth Session was held on Thursday evening, the 12th December, 1861,

THE PRESIDENT IN THE CHAIR.

The SECRETARY announced the donation to the Library of the 'Pharmaceutical Journal' for December, from the Society; and to the Museum, a large calculus taken from the colon of a horse, and weighing nearly ten pounds, from Mr. J. Ellis. A specimen of the granular effervescing carbonate of iron, from Mr. S. Banner.

The PRESIDENT announced the programme of the *conversazione* on the 20th instant.

Mr. J. A. FORREST read a paper "On a new method of burning photographs into glass, and producing the same in stained glass colours;" and afterwards exhibited a selection of beautiful specimens, executed by the new process.

The thanks of the meeting were given to Mr. Forrest, for his paper, and to the several donors.

CONVERSAZIONE.

The sixth of these agreeable *réunions* took place on the 20th December, 1861, at the Royal Institution, and as usual, was attended by a large and fashionable company, numbering about 360. As on former occasions, the entire suite of rooms, including the splendid museums of natural history, geology, technology, and materia medica, together with the gallery of art, were thrown open for promenade throughout the evening, and in some of the apartments were placed a variety of interesting works of art in bronze and electro-plate, collections of scientific apparatus, curious mechanical appliances, etc., all furnished specially for the occasion. In another department was exhibited a large and valuable collection of photographic specimens, intended to illustrate the progress and present state of that useful art. A number of powerful and improved microscopes were placed in the geological gallery, and here the following gentlemen illustrated the various departments of microscopical science:—Mr. S. Banner, and Mr. J. Abraham, animal circulation; Mr. G. M. Browne, Mr. L. Hardman, and Mr. A. Overbeck, diatomaceæ; Mr. W. H. Weightman, entomostraca; Mr. C. J. English, injections of animal tissues; Mr. W. J. Baker, parts of insects; Mr. W. Allen and Mr. H. S. Evans, polarization of light; Mr. N. Mercer, micro-photographs; Mr. T. J. Moore, marine objects. A very attractive feature was the exhibition of Professor Wheatstone's private telegraphic apparatus, placed at each end of the large bird room. Mr. Joseph Castley, representative in Liverpool of the firm of Messrs. Wheatley, Kirk, and Co., of Manchester, district engineers for the Private Telegraph Company, was in attendance and explained the principle and mode of working the apparatus. Visitors, having received the necessary instructions, were permitted to send messages from one extremity of the room to the other. Amongst the principal objects of attraction we may also mention some beautiful specimens of photographs burnt in glass, furnished by Messrs. Forrest and Co., of Lime Street; remarkably chaste and elegantly-designed

artieles in eleetro-plate and bronze, exhibited by Messrs. Elkington and Co., of Chureh Street; splendidly-exeeuted photographs, by Mr. Swift, of Bold Street; magic elock, mechanieal figures, and other artieles, by Mr. J. G. Jaeob, of Chureh Street; and several very handsome clocks, admirably-modelled statuettes, ete., by Messrs. Frisch and Co., of Chureh Street. Mr. Moore, the talented curator of the Free Public Museum, as usual exhibited a collection of euriosities in natural history, ete. They ineluded an eleetrie eel from Guiana, aquaria from the Museum, eontaining British sea anemones, crustaeea, and a series of mollusea and aetiniæ from New Brunswiek, collected by Captain Mortimer; a series of skins of birds-of-paradise, illustrating the speeies *rubia* and *regia*, these having been lent for exhibition by Mr. Leadbetter, of London. Captain Mortimer exhibited a joss eut from roek crystal, from a temple at Hongkong; speeimens of pearls and gems plundered by the rebels during the insurreetion in China; and a Japanese eoin. A reasonable time having been allowed for the inspection of the various objeets of interest, the majority of the eompany adjourned to the lecture theatre, where the ehair was taken by Dr. Edwards, the President of the Association, and a leeture on astronomy was delivered by Professor Hamilton, F.R.A.S., F.C.S. The subject was profusely illustrated by models, diagrams, and a series of dissolving views projeeted by the oxy-caleium lantern, under the direetion of Mr. H. Sugden Evans. The leeture was of eonsiderable length, but it was rendered very interesting by the lueid observations and explanations of the Professor, and the exeellent illustrations. On the termination of this really instructive diseourse there was an interval for refreshments promenade, mieroseopie observation, ete. At half past nine the visitors again assembled in the theatre to hear a lecture from the President on "Stellar Chemistry." The Doetor's dissertation was illustrated by some admirable experiments with Serrin's eleetric light and lantern, showing the prismatie spectra of solar metals, together with projeetions of photographs of gaseous and metallic speetra, these illustrations being under the charge of Mr. W. Ladd, of London. This leeture also was both instruetive and interesting, and was listened to with marked attention. This terminated the programme, and the eompany separated soon after, much pleased both with the soeial and seientifie portion of the evening's proeeedings.

ORIGINAL AND EXTRACTED ARTICLES.

NOTES ON CHINESE MATERIA MEDICA.

BY DANIEL HANBURY, F.L.S.

(*Continued from page* 318.)

厚朴 *How-pŭh;* Bark of *Magnolia hypoleuca* S. et Z. (*Magnoliaceæ*); *Heú-pŏ*, Cleyer, *Med. Simp.*, No. 200; Tatarinov, *Catal. Med. Sinens.*, p. 8; *Pun-tsaou*, fig. 735.

A rough, thick bark, which in my specimen has been tightly rolled round several times, so as form a cylinder 7 inches long by $2\frac{1}{2}$ in diameter. The bark has a bitterish, pungent, aromatic taste, and is prized by the Chinese on account of its reputed tonic and invigorating properties.

黃栢 *Hwang-pĭh*; Bark of *Pterocarpus flavus* Lour.; Tatarinov, *Catal. Med. Sinens.*, p. 9.

Stated by Loureiro to be resolvent and vulnerary; also to be used as a yellow dye for silk.

開楊花 *Naou-yang-hwa;* Flowers of *Rhododendron?* (*Ericaceæ*); Cleyer, *Med. Simp.*, No. 186.

Used in conjunction with aconite root as a topical application to produce

insensibility to the pain of a surgical operation (*vide* p. 263). Dr. Horaninow refers this Chinese name to *Hyoscyamus*.

石韋 *Shĭh-wei;* Fronds of *Niphobolus Lingua* Spr., *Acrostichum Lingua* Thunb. *Flor. Jap.*, tab. 33 (*Filices*); *Pun-tsaou*, fig. 474.

五倍子 *Woo-pei-tsze;* Galls of *Rhus semi-alata* Murr. (*Anacardiaceæ*); *U poì çù*, Cleyer, *Med. Simp.*, No. 225; *Pun-tsaou*, fig. 839.

These galls now constitute so regular an article of commerce that it is not needful here to describe them. Some pharmacologists have asserted that *Distylium racemosum* S. et Z., a large tree of the nat. ord. *Hamamelideæ*, growing in Japan, is the plant upon which they are produced. That this is erroneous, I have satisfied myself,—1. By an examination of herbarium specimens of this plant, and of *Rhus semi-alata* Murr. 2. By the examination of original packages of the galls, imported from China and Japan, which I find to contain the leaf-stalks and remains of flowers of *Rhus*, but never anything which I could trace to *Distylium*. 3. By the completely different form of the galls of the *Distylium*, as figured by Siebold and Zuccarini in their 'Flora Japonica,' tab. 94.

Chinese galls (so-called) have lately been imported from Japan; they are somewhat smaller than those shipped from China, but appear to be produced by the same tree.

沒石子 *Mŭh-shĭh-tsze;* Galls of *Quercus* sp. (*Amentaceæ*); *Pun-tsaou*, fig. 756.

These do not differ from the galls of *Quercus infectoria* Oliv., the common Aleppo galls of Europe.

茯苓 *Fŭh-ling; Pachyma Cocos* Fries (*Fungi*); *Lycoperdon solidum* Gronovius; *Pĕ fŏ lîm*, Cleyer, *Med. Simp.*, No. 189; Tatarinov, *Cat. Med. Sinens.*, pp. 2–23; *Pun-tsaou*, fig 822; Indian Bread, or Tuckahoe.

A very remarkable substance resembling large, ponderous, rounded tubers, having a rough, blackish-brown, bark-like exterior, and consisting internally of a compact mass of considerable hardness, varying in colour from cinnamon-brown to pure white. These tuberiform bodies which in weight vary from a few ounces up to several pounds, are found attached to the roots of fir-trees, or sometimes buried in the ground in localities where firs no longer grow. They occur in South Carolina, in some of the northern and western provinces of China, and in Japan. Their true nature is sufficiently perplexing. The older writers, as Martinius and Cleyer, considered them to be a sort of *China Root* (*Smilax*), a supposition which their outward appearance certainly favours, but which is immediately negatived when we find them to contain no trace of starch. Loureiro and Endlicher are content to describe them as *tubers* found upon the roots of fir-trees. Other botanists have placed them among *Fungi;* Gronovius and Walter in the genus *Lycoperdon*, Schweinitz in *Sclerotium*, Oken, Horaninow, and Fries in *Pachyma*. The latest observations on the subject are some which were submitted to the Linnean Society by Mr. F. Currey and myself last year, and published in the 'Linnean Transactions.'* The opinion there expressed is that these tuber-like bodies are an altered state of the root of the tree, probably occasioned by the presence of a fungus, the mycelium of which traverses, disintegrates, or even obliterates, the wood and bark. This mycelium appears under the microscope in the form of fine

* Vol. xxiii. p. 94, where the reader will find full references to the botanical works here referred to, as well as figures of *Pachyma Cocos* Fries. See also Berkeley *On some Tuberiform productions from China*, Journ. of Proceedings of Linn. Soc. vol. iii., Botany, p. 102, where there is a translation from the Chinese regarding these substanees.

threads, usually more or less mixed with bodies of irregular shape, somewhat resembling starch-granules, but which are, apparently, cells of the woody tissue in a more or less advanced state of disease and distortion. Nothing is known of the more developed form of the fungus represented by this mycelium.

The American *Fŭh-ling* has been examined chemically by Professor Ellett, of South Carolina College, who has stated it to consist entirely of pure pectine of Braconnot;* but I think its composition deserves some further investigation. I find that the pure-white internal substance (which is quite insipid and inodorous) is very slightly soluble in cold rectified spirit and in cold water, and not more so when boiled in water, the solution in each case yielding a flocculent precipitate with acetate of lead. When boiled in a weak solution of carbonate of soda, the substance dissolves rather more freely, and the solution affords a scanty gelatinous precipitate (*pectic acid?*) when treated with an acid, or (*pectate of lime?*) with a solution of lime.

In China the *Fŭh-ling* is made into edible cakes, which are frequently sold in the street; it is also reputed medicinal in a variety of disorders. In America it has also been used as an article of food, whence the name *Indian Bread*.

豬苓 *Choo-ling;* Berkeley, *Journal of Proceedings of Linnean Society*, vol. iii. 1859, Botany, p. 102; Currey and Hanbury, *Linn. Trans.*, vol. xxiii. p. 95, tab. 9, fig. 10–13; *Chū lîm*, Cleyer, *Med. Simp.*, No. 207; Tatarinov, *Cat. Med. Sinens.*, p. 17; *Pun-tsaou*, fig. 824.

Tuberiform bodies of much smaller size, less regular shape, as well as less ponderous than the preceding; they are covered with a thin, black, more or less shrivelled cuticle, which closely invests a homogeneous, corky, yellowish-brown substance. The microscopic structure of these quasi-tubers resembles that of the *Fŭh-ling;* but the threads by which their substance is traversed are more interwoven and more branched, and have not the appearance of being the mycelium of a fungus. The same irregularly shaped bodies as seen in *Fŭh-ling*, are also present, but their dimensions are smaller. In a few specimens, an abundance of doubly prismatic crystals has been noticed. "Treated with the same chemical tests as the *Foo-ling*," remarks Mr. Berkeley, "it [the *Choo-ling*] exhibits precisely the same reaction. There is not the slightest trace of starch or cellulose, and it is evident that the structure is not accordant with that of any fungus or phænogamous tuber."

The *Choo-ling* is stated by Chinese authors to be parasitic on a tree, beneath which it is picked up in spring and autumn. Many fanciful virtues not worth repeating are attributed to it.

雷丸 *Luy-wan; Mylitta lapidescens* Horaninow (*Fungi*); Tatarinov, *Catal. Med. Sinens.*, p. 34; Currey and Hanbury, *Linn. Trans.* vol. xxiii. p. 96, tab. 9, fig. 14–17; *Lûi uôn*, Cleyer, *Med. Simp.*, No. 227; *Pun-tsaou*, fig. 825.

This substance occurs in the form of small rounded nodules, varying in weight from five grains to nearly half-an-ounce. Their exterior surface is of a dark brownish-grey colour, and generally finely corrugated: their inner substance has a granular appearance, is of a pinkish-brown colour, and of almost stony hardness. A microscopic section shows that the tissue is divided into *areolæ* after the manner of that of the truffle and other underground fungi; no trace of fructification has been observed in any specimen.

This curious vegetable production, which had previously only been known

* Berkeley, *l. c.* p. 106.

Fig. 17. The Wax-tree (*Fraxinus chinensis* Roxb.); Wax-Insect (*Coccus Pe-la* Westw.); and branch incrusted with the wax.

[*To face p.* 423.

from its occurrence in the drug-shops of China, has lately been obtained in Southern India by Dr. E. J. Waring, who states that it is dug from the chalk-beds in the mountains separating Travancore from Tinnevelly. In India, as in China also, it is used as a medicine, being regarded as powerfully diuretic.

水安息香 *Shuy-gan-seih-heang*; literally, *Liquid Benzoin.*

This drug is a dark-brown semi-fluid resin, having an extremely fragrant odour of storax. It is met with in small globular wooden shells, apparently the pericarp of some fruit, about $1\frac{3}{4}$ inches in diameter, closed with wax. Its origin is very obscure. The Chinese assert that they import it from the Straits, or, in other words, by way of the Indian Archipelago; but I have not been able to trace it either there or in Siam. It is curious, moreover, that this fragrant resin, even to the shell enclosing it, is extremely like that kind of balsam of Peru which was brought to Europe long ago in the capsules of a *Lecythis*, and naturally supposed to be a product of South America.

The *Liquid Benzoin* is very expensive, a single shell, holding perhaps half an ounce, being worth four dollars, or 20*s*.

松香 *Sung-heang; Sum hiam*, Cleyer, *Med. Simp.*, No. 190; Tatarinov, *Catal. Med. Sinens.*, p. 50.—A pale-yellow terebinthinous resin, closely resembling mastich, occurring in small irregular tears, somewhat opaque externally from mutual friction, but perfectly transparent within, and exhibiting a vitreous fracture. It would be a good substitute for mastich.

The name *Sung-heang* is said to be also applied to other terebinthinous resins.

冰片 *Ping-peën;* Camphor of *Dryobalanops Camphora* Colebr. (*Dipterocarpeæ*); Borneo or Baros Camphor.

Obtained chiefly in Sumatra from fissures in the interior of the trunk of the tree. As the best tree when felled rarely yields more than a few ounces, the drug is very costly, being worth on the spot about 50*s*. per lb. It is chiefly exported to China, but a considerable quantity is consumed in the island for the purpose of embalming the bodies of the petty chiefs, a custom the expense of which often proves exceedingly ruinous to the family of the deceased. The best quality of this camphor occurs in the form of flat colourless crystals, the largest of which rarely exceeds half an inch across. An inferior quality is coarsely pulverulent, and of a grey colour. Dryobalanops camphor has the odour of common or laurel camphor, mixed with something that has been likened to patchouli. It is less volatile than laurel camphor, and has a greater specific gravity, so that it sinks in water. Its composition is $C_{20}\ H_{18}\ O_2$, that of laurel camphor being $C_{20}\ H_{16}\ O_2$.

蟲白蠟 *Chung-pĭh-lah:* Chinese Insect Wax. Secreted by *Coccus Pe-la* Westw.,‡ upon the branches of *Fraxinus chinensis* Roxb., which is cultivated for the purpose, and possibly upon other trees. Some account of

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* Mr. Westwood's description of this *Coccus* was published in the 'Gardeners' Chronicle' for 30th July, 1853. Part of the woodcut that accompanied it I have caused to be copied, and have added to it a figure of *Fraxinus chinensis* Roxb., in fruit, and one of a branch of that tree coated by the insect with its waxy secretion,—both taken from specimens in my own collection. In this cut (fig. 17), A. represents the winged male insect, the body of which is of a dark chestnut colour; the abdomen and elongated anal point reddish-buff; legs reddish, thighs brown, wings very slightly stained with brownish-buff, and the two subcostal veins flesh-coloured. B. Female insect, showing the mode in which the body envelopes a twig. C. A very minute larva, half the size of a pin's head; and D, one of the young at a more advanced period of growth.

the habits of the insect by a competent observer are much required, the Chinese statements on the subject being extremely obscure.

石决明 *Shĭh-keuc-ming;* Shells of *Haliotis funebris* Reeve; *Pun-tsaou*, fig. 969; Tatarinov, *Cat. Med. Sinens.*, p. 54; Cleyer, *Med. Simp.*, No. 172.

This shell is stated to occur on the coasts of Fŭh-kien and Kwantung. Messrs. Cuming and Lovell Reeve, who have examined it, concur in referring it to *Haliotis funebris*, a New Holland species, figured by the latter gentleman in his beautiful 'Conchologia Iconica,' sect. *Haliotis*, pl. xii. 38.

龍骨 *Lung-kwŭh;* literally, *Dragon's Bones; Lûm cŏ*, Cleyer, *Med. Simp.*, No. 252; *Pun-tsaou*, fig. 888.

This commodity is sold in the Chinese shops in irregular pieces of a few ounces weight, curiously covered with paper and marked with a stamp. Upon placing a thin slice of it under the microscope, its true nature is revealed, and it is proved to be *fossil ivory*. Many imaginary virtues are attributed to it, as well as to the following.

龍齒 *Lung-che;* literally, *Dragon's Teeth.*—These also are fossil, and obtained, according to the Chinese, in the north-western provinces of Shen-si and Shan-si. Mr. G. R. Waterhouse, of the British Museum, who has, at my request, been good enough to examine a considerable number of specimens, is able to distinguish among them the following:—molars of the lower jaw of *Rhinoceros tichorhinus* Cuv.; fragment of tooth of *Mastodon;* of *Elephas*, near *E. insignis* F. et C.; many molars of *Equus*, teeth of *Hippotherium*, comprising molars of both jaws, agreeing perfectly with those of the *Hippotherium* of Germany and France; an upper molar of an *Hippotherium* probably distinct from the preceding; portion of an upper jaw, with the four posterior molars, of a ruminant allied to the sheep, but of smaller size; molar teeth of two species of stag; molar tooth of bear.

石蠏 *Shĭh-heae;* Fossil Crabs of the Post-Tertiary Period. *Pun-tsaou*, fig. 66.

A celebrated Chinese medicine mentioned by Kircher, Grosier, Du Halde, Cleyer and others, and supposed to be an antidote to all kinds of poison, as well as to possess innumerable other virtues. The specimens which I have received and which are said to be obtained in the island of Hainan and on the opposite shores of Kwang-si, belong to a single species, *Macrophthalmus Latreillii* Edw. (*Gonoplax Latreillei* Desm.), with the exception of one which is referable to a species of the genus *Cancer* not yet described. Probably identical with *M. Latreillii* is the fossil *M. Desmarestii*, described and figured by M. Lucas in the "Annales de la Société Entomologique de France."* Nor is the animal found merely in the fossil state, for, as pointed out to me by Mr. H. Woodward of the British Museum, who has examined the subject with care, a recent species found in the Philippines and named by Mr. Adam White *M. serratus*,† appears to possess no character that can distinguish it from the fossil form.

My friend M. Rondot of Paris obtained from the Chinese *pharmaciens* at Canton, in addition to specimens of the *Macrophthalmus*, a fine example of *Portunus* (*Lupa*) *leucodon* Desm., recently shown by Dr. Alphonse Milne-Edwards‡ to be identical with the *Scylla serrata* of De Haan§ still found

* Vol. viii. Série 1, 1839, p. 567, t. 20.
† *British Museum List of Crustacea*, London, 1847, p. 37.
‡ *Annales des Sciences Naturelles*, Zoolog., tom. xiv. (1861), pl. i. and ii.
§ *Fauna Japonica*, 1835.

living in Japan, the Philippines and at Port Natal. It is a much larger crab than the others, measuring seven to eight inches across the carapace. There are several very perfect specimens of it, reputed to be from the Philippines, in the geological collection of the British Museum.

石燕 *Shih-yen;* Fossil Shells; Tatarinov, *Cat. Med. Sinens.*, p. 54; *Pun-tsaou*, fig. 65.

These fossils have been examined and described by Mr. Thomas Davidson, to whose account and figures in the 'Proceedings of the Geological Society' (June 15, 1853), I refer the reader who wishes for full details. The actual specimens are in the British Museum. Mr. Davidson remarks that the specimens belong to eight Devonian species, seven of which are common to several European localities, among which may be mentioned Ferques and Néhou (France), Belgium and the Eifel, but they are not found all existing together in any one of these localities. In external aspect the Chinese specimens most resemble those from Ferques, where, however, two of them, *Cyrtia Murchisoniana* and *Rhynchonella Hanburii*, have not yet been discovered. If to these be added two described by M. de Koninck, the total number of Chinese Devonian types at present known will amount to ten species, viz.:—3 of *Spirifer*, 2 of *Rhynchonella*, 1 *Productus*, 1 *Crania*, 1 *Cornulites*, 1 *Spirorbis*, and 1 *Aulopora*.

These fossils are asserted to occur in the southern province of Kwang-si, where coal is also met with.

FERRI AMMONIO-PHOSPHAS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—As no simple and easy means of rendering Phosphate of Iron permanently soluble, except in small proportions, have (so far as I know) hitherto been published, I am induced to send you an account of a process by which not only may the phosphate be dissolved, but a salt obtained, soluble in water to any extent, and containing very nearly its own weight of pyrophosphate of iron. I was led to its discovery a short time ago, whilst seeking to dissolve some pyrophosphate of iron in basic citrate of ammonia, and thinking it might probably be of use, shall be obliged if you will publish it.

Heat phosphate of soda to redness in a crucible; take of the calcined salt one part; crystallized sulphate of iron, two parts; water sufficient. Dissolve the salts separately in about fifteen parts of water, and mix the solutions; wash, collect, and dry the precipitate. Take of the pyrophosphate of iron thus produced, one part; liquor ammoniæ, sp. gr. ·880, one part; water ten parts. Rub the phosphate in a mortar with the ammonia diluted with two or three parts of water until dissolved, then add the remainder of the water, filter the solution and evaporate slowly and carefully, adding a little ammonia towards the end.

The ammonio-phosphate of iron thus produced is in scales somewhat resembling ferri ammon. cit., but rather darker in colour, soluble in water to any extent, and is not deliquescent.

The name ammonio-phosphate of iron will sufficiently indicate its composition, and distinguish it from any other of the phosphates of iron.

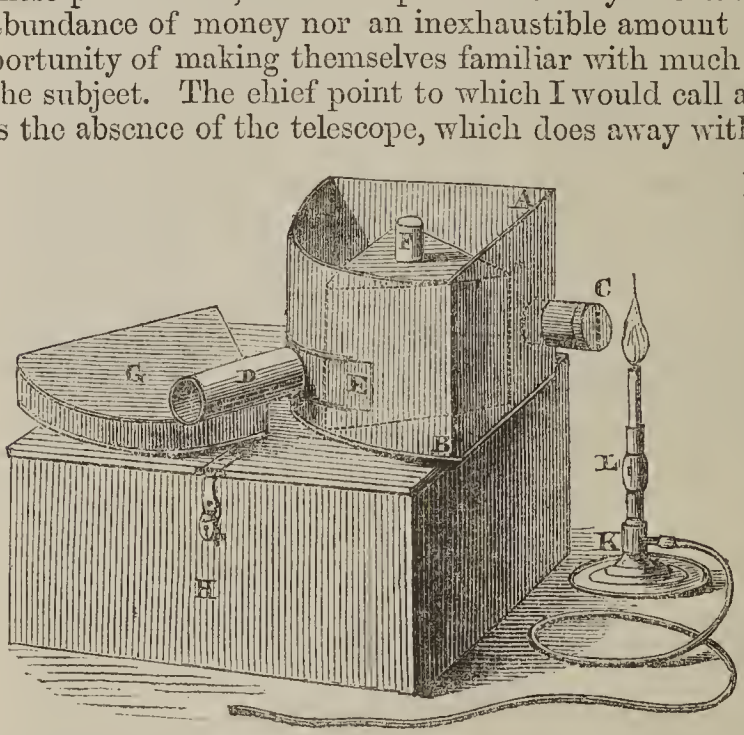
Yours, etc.,
W. Wilkinson.

263, *Cheetham Hill, Manchester,*
January 17, 1862.

APPARATUS FOR SPECTRUM ANALYSIS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

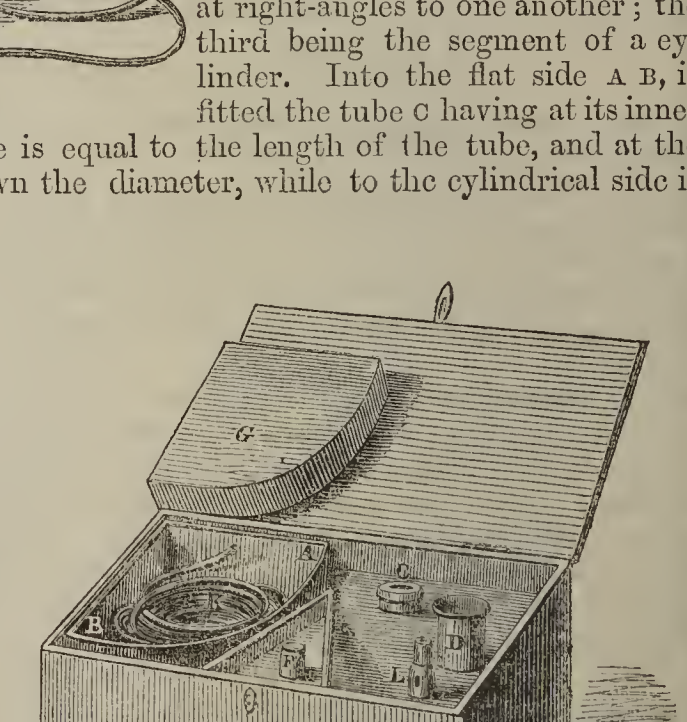
Sir,—Having been for some little time interested, like many others, in the very beautiful disclosures made to us by Messrs. Kirchhoff and Bunsen and their train, on the subject of the bright lines formed in the spectra of incandescent bodies, I venture to submit to you, for insertion in the PHARMACEUTICAL JOURNAL, an account of a cheap and simple form of apparatus which I have devised for showing the principal of these phenomena, in the hope that it may afford to those who have neither a superabundance of money nor an inexhaustible amount of time at their command, an opportunity of making themselves familiar with much of the very little that is known of the subject. The chief point to which I would call attention in this form of apparatus, is the absence of the telescope, which does away with a considerable source of expense.



Another feature is the reduction in the cost of the prism, which when ground out of one piece of glass, is necessarily an expensive item. This has not been done, nor is it to be done, without much patience and care; but it will, when properly prepared, be found perfectly impervious to the noxious vapour of the bisulphide of carbon.

The accompanying woodcuts show the apparatus both in use and packed up. A B is a strong box of tinned iron, having two of its sides at right-angles to one another; the third being the segment of a cylinder. Into the flat side A B, is fitted the tube C having at its inner end a convex lens whose focal distance is equal to the length of the tube, and at the outer end a cap with a narrow slit down the diameter, while to the cylindrical side is fitted a slide E carrying the tube D.

The prism consists of a strong triangular tin box, with a square piece cut out of the centre of two of its sides; into each of these two apertures is cemented a thin piece of plate-glass, the cement used being plaster of Paris and glue. This must be allowed to dry and harden completely before the prism is filled, as upon this, success chiefly depends. When hard, the sides and edges are blackened with lamp-black and glue; and when this has thoroughly dried, the whole may be varnished. The bisulphide of carbon is introduced through an aperture in the top of the prism; this is afterwards closed with a cork and a cap.



To use the apparatus, the prism is placed in the box A B, in the position figured in the cut, and the gas is burned in a Bunsen's burner just in front of the slit at C. The light falling upon the prism is refracted by it in the direction of the tube D, which is then, by means of the slide E, brought into such a position that a good view of the spectrum may be obtained through it.

When any of the metals, alkalies, or alkaline earths are burned before the slit C, the lines peculiar to the substances burned are at once seen by looking through the tube D, and the width of the lines may be increased or diminished by turning the prism round on its axis. The box is then closed by the lid G. Such is the apparatus in use. To pack it, the tubes C and D are removed from their sockets, the Bunsen's burner unscrewed from its stand; and these three are slipped into their respective holes in the box (*vide* cut). The prism is placed in the triangular compartment in the case; and the stand of the burner with the india-rubber tubing fits into the box A B; this in its turn fits closely into the case; and the whole is thus contained in a small space, the packing case forming the stand when the apparatus is in use.

Hoping that some of your readers may find the above of use to them, and apologizing for taking up so much of your valuable space,

I am, Sir, yours very respectfully,

ALEXANDER WAUGH.

177, *Regent Street.*

REPORT OF THE

RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATIONS,

AND OF THE

APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On the Estimation of Sulphur in Iron or Copper Pyrites.—The employment of Sicilian sulphur in the manufacture of oil of vitriol, is now almost entirely abandoned in favour of iron and other pyrites. As the composition of these minerals however is extremely variable and uncertain, it becomes necessary to determine their value for this purpose by a process of analysis. Moreover, to burn the pyrites completely is difficult, and a certain proportion of sulphur generally remains in the residue; it is frequently important to the manufacturer to determine this amount. It becomes obvious therefore that a simple and expeditious process of assay by which the sulphur in these minerals could be determined, would be an important acquisition to manufacturing chemistry. M. J. Pelouze has accordingly devised a very elegant, and apparently accurate, method for effecting these determinations, which he has recently communicated to the French Academy. The ordinary process of analysis in which the sulphur is first converted by aqua regia into sulphuric acid, and then precipitated and weighed as sulphate of baryta, is long and tedious; the method of M. Pelouze is on the contrary simple and rapid in execution. It consists in heating the mineral with chlorate of potash and carbonate of soda, whereby both the sulphur and the metal become oxidized at the expense of the oxygen of the chlorate of potash, and the sulphur is converted into sulphuric acid which combines with the soda of the carbonate, forming sulphate of soda. Starting then with a definite weighed quantity of carbonate of soda, it is easy at the end of the operation to determine the amount which remains undecomposed, by a process of alkalimetry: the difference indicates the amount of sulphate of soda which has been formed during the operation, and consequently the amount of sulphur present in the mineral. In the alkalimetric process M. Pelouze recommends the employment of sulphuric acid of such a strength that ten grammes of pure and dry carbonate of soda are neutralized by 92·4 c.c. of the acid. These numbers correspond to equal equivalents of carbonate of soda (NaO,CO_2) and monohydrated sulphuric acid (SO_3HO). One litre of the acid contains 100 grammes of the monohydrated acid or 32·653 of sulphur. If therefore, for example, in an analysis of a pyrites 5 grammes of carbonate of soda are employed, this quantity would require 46·2 c.c. of the test acid for its neutralization: but if after the combustion only 30·2 c.c. of the acid are found necessary, it indicates that a quantity of sulphuric acid has been formed from the sulphur in the pyrites exactly equal to the amount present in 16 c.c. of the test acid, 16 being the difference between 46·2 and 30·2. It is only necessary therefore to calculate the amount of sulphur present in the 16 c.c. to

find the amount originally present in the pyrites. This is readily done by the following equation :—

$$1000 \text{ c.c.} : 32{\cdot}653 :: 16 \text{ c.c.} : x$$

x in this case equals 0·523, the amount of sulphur present in the quantity of pyrites operated upon.

The following is the method of operating :—One gramme of *porphyrized* pyrites, five grammes of pure and dry carbonate of soda, seven grammes of chlorate of potash, and five grammes of fused chloride of sodium, are carefully mixed in a porcelain mortar introduced into a deflagrating vessel and gradually heated for eight or ten minutes to dull redness. The common salt is added for the purpose of moderating the action and preventing anything from being projected out of the crucible. When the mass has cooled it is boiled with distilled water, filtered, and the insoluble oxides washed repeatedly with hot water.

The next point is to ascertain how much of the test acid above described is necessary to exactly neutralize the filtrate and washings. This is done according to the usual method of alkalimetric determinations. Supposing this quantity to be 34 cubic centimetres, it is subtracted from 46·2 c.c. (the amount of acid necessary to neutralize the original 5 grammes of carbonate of soda) and the difference, 12·2 c.c. represents the amount of sulphuric acid which has been formed from the pyrites. By multiplying this number by 32·653 and dividing by 100, the weight of the sulphur sought is obtained. In the case supposed this would be 0·398 from the gramme or 38·8 per cent.

The residual oxides, after washing, should entirely dissolve in hydrochloric acid without leaving any deposit of sulphur. If any portion of sulphur exists the analysis must be recommenced. The author has satisfied himself by careful experiments that during the combustion, there is no evolution of sulphurous acid, and that the reaction is perfectly definite and reliable. A number of comparative experiments were also made with the view of testing this method against those commonly used. The results were perfectly satisfactory. It is, of course, of the utmost importance to weigh the carbonate of soda with rigid accuracy, and to avoid the possibility of any of it being lost in the process. Any loss of the alkali would increase the figure representing the amount of sulphur. It is also necessary to reduce the pyrites to the state of an impalpable powder by porphyrization, and to effect a very perfect admixture of the ingredients before heating.

In the analysis of roasted pyrites, for the purpose of ascertaining the amount of sulphur which remains unburnt, the author omits the common salt, because the action then takes place quietly and without any deflagration.

Researches on Galbanum.*—If galbanum, broken in fragments, be distilled with water, it yields about seven per cent. of a volatile oil, which, dried and repeatedly rectified, has a constant boiling-point at 160° to 161° (321° Fahr.). Its specific gravity is 0·882 at 9° (48·2 Fahr.)

This oil causes the plane of polarization to deviate to the right. Its rotary power is 0·1857. Its index of refraction 1·4542. Its composition is expressed by the formula $C_{20}H_{16}$. It forms, in common with the other isomeric members of this group, a crystalline compound with hydrochloric acid.

The residue of the distillation consists of a resinous mass, and a liquid holding in solution extractive matter and gum. The resinous mass is boiled with milk of lime, filtered, and the resin precipitated from the filtrate by hydrochloric acid. This resin is soluble in alcohol, ether, and partially in bisulphide of carbon. It has not been obtained in a crystalline form. If the alcoholic solution be saturated with hydrochloric acid, and heated to 100° (212° Fahr.) in a sealed tube, ombelliferone is obtained as a product of decomposition. MM. Zwenger and Sommer first found this body among the products of destructive distillation of galbanum. If the purified resin be submitted to destructive distillation, the principal product is a greenish-blue oil of an aromatic odour, which deposits after some time an abundant crop of crystals of ombelliferone. These are separated from the oil, and purified by recrystallization from boiling water. The white crystals of ombelliferone thus obtained have the composition $C_{12}H_4O_4$. By the action of bromine a substitution product is obtained having

* Répertoire de Chimie.

the formula $C_{12}H_2Br_2O_4$; this substance is crystalline, insoluble in water, but soluble in boiling alcohol.

The greenish-blue oil from which the crystals of ombelliferone have been separated, is purified by washing with boiling water, and then with a very dilute solution of potash, which removes the last traces of ombelliferone. It is again washed with water, and dried in an air bath at 110° (230° Fahr.). After two rectifications, it is obtained pure, of a magnificent azure-blue colour, and an aromatic odour. It is soluble in alcohol, but insoluble in alkalies. The perchloride of iron in alcoholic solution colours it green; nitric acid, orange; sulphuric acid, brownish-yellow. Bromine resinifies it, producing hydrobromic acid. It thickens by refrigeration, without solidifying. Its boiling-point is 289° (552° Fahr.). Its composition corresponds to the formula

$$\left.\begin{matrix} C_{40}H_{30}O_2 \text{ or } C_{40}H_{29} \\ H \end{matrix}\right\} O_2.$$

On treating this oil with potassium or sodium, a colourless oil is obtained, having a boiling point constant at 254° (489° Fahr.), and which is soluble in absolute alcohol, ether, and bisulphide of carbon. Perchloride of iron does not affect it; bromine attacks it energetically. The analysis of this body has led to the formula

$$\left.\begin{matrix} C_{40}H_{30}; \text{ or } C_{40}H_{29} \\ H \end{matrix}\right\}$$

The blue oil distilled over anhydrous phosphoric acid is rapidly decolorized, and a yellowish oil is obtained, boiling at 250° to 253° (482° to 487° Fahr.). This has the composition

$$\left.\begin{matrix} C_{40}H_{29} \\ C_{40}H_{29} \end{matrix}\right\} O_2$$

Thus it will be seen that the blue oil, the product of the action of sodium, and that obtained by anhydrous phosphoric acid, have the relations of an alcohol to its hydride and its ether.

M. Hlasiwetz, in whose laboratory these researches were conducted, compares the blue oil of galbanum with the essential oil of chamomile, also blue, remarking that taking M. Bornträger's formula for the latter as $C_{40}H_{30}O_4$, it only differs from the former in containing 2HO in excess. It is evident, however, from the following paper by M. Bizio, that if his results are accurate, the composition of the oil of chamomile is not that assigned by M. Bornträger.

On the Essential Oil of Chamomile (Matricaria Chamomilla).*—Gerhardt has put forward the idea that the essential oil of chamomile from *Matricaria Chamomilla*, analyzed by M. Bornträger, was probably identical with the essential oil from the officinal species *Anthemis nobilis*. The author has arrived at a different result, which obliges him to oppose the opinion of Gerhardt.

The freezing point of the essential oil of chamomile has been indicated by different observers at −6°, −10°, −12°, and 0° (21°, 14°, 10°, and 32° Fahr.). That examined by M. Bizio solidified below −20° (−4° Fahr.). This oil loses its fine blue colour, and becomes green in contact with dilute nitric or hydrochloric acids. Concentrated sulphuric acid produces a reddish-yellow shade. Under the influence of chlorine it is decolorized and transformed into a dense white mass. Nascent hydrogen and sulphuretted hydrogen are without action on an alcoholic solution of the oil. With iodine it thickens with development of heat, and becomes reddish-brown. Bromine acts violently on it, and transforms it into a brown, tenacious, elastic mass, insoluble in alcohol, partly soluble in ether.

Submitted to distillation it commences to boil at 240° (464 Fahr.). The temperature gradually rises to 300° (572° Far.), at which temperature it is decomposed. An abundant residue of resinous matter remains in the retort. The distilled oil could not be resolved further by fractional distillation.

A concentrated solution of bisulphite of potash was without action. When a current of gaseous ammonia was passed through an ethereal solution of the oil, crystals separated, but in too small quantity for analysis. After separation of the crystals and the excess of ether and ammonia, the oil was found to be completely unaltered.

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* Répertoire de Chimie.

Hydrochloric acid gas produces elevation of temperature, and transforms the oil into a brown viscid mass. After removing the excess of acid, the oil is obtained on distillation apparently unaltered. The acid therefore does not form a definite compound with it. If the oil be gradually dropped into hydrate of potash in a state of fusion, it undergoes, even with this energetic re-agent, scarcely any alteration. If it be distilled over anhydrous phosphoric acid, a nearly colourless oil is obtained, having an odour of petroleum and nearly the composition of camphine, $C_{20}H_{16}$, from which however it differs in containing in addition the elements of water. M. Bizio places it amongst the oxygenated oils which represent the hydrates of that numerous series of hydrocarbons isomeric with camphine, and assigns to it the following formula:

$$5C_{20}H_{16},6HO \text{ or } 2C_{20}H_{16}+3(H_{20}C_{16},2HO).$$

This being the chemical constitution of this body, it is remarkable that it forms no definite compound with hydrochloric acid, a reaction characteristic of other bodies of this nature. To assure himself of this fact the author examined also the action of dry hydrochloric acid gas on the hydrocarbon $C_{20}H_{16}$, which was obtained by means of anhydrous phosphoric acid. The product, freed from excess of hydrochloric acid by washing with water and treating with carbonate of lime, gave a composition corresponding to the formula $5\,C_{20}H_{16}+HCl$.

The author remarks in conclusion that the essential oil of ginger (*Zingiber officinale*) analysed by M. Papousek, and the stearoptene contained in the volatile oil from *Sedum palustre* analysed by M. Buchner, have the same composition as the essential oil of chamomile, $5C_{20}H_{16},6H$.

ON THE INFLUENCE OF CULTIVATION UPON MEDICINAL PLANTS.

Some correspondents have recently expressed to us their belief, that extracts made from herbs growing wild keep better than those prepared from the same plants in a cultivated condition. As this is a point of great interest, and one which has an important bearing upon the preparation of medicinal extracts, we subjoin the following translation from '*L'Union Pharmaceutique*,' of a Report recently presented to the Imperial Society of Medicine of Toulouse, *On the influence of cultivation upon medicinal Plants*; by M. Timbal-Lagrave.

"At the present time, it is scarcely necessary to insist upon the advantages to be derived from a knowledge of botany, and the important applications of such knowledge in the treatment of disease. Whilst we thus admit the importance of an acquaintance with the medicinal properties of plants, we must acknowledge, however, that it is not so easy to ascertain with certainty under what conditions medicinal plants should be chosen and collected. Although many authors have written treatises on Therapeutics and Pharmacology, we are far from knowing, as yet, the principles which ought to be acted upon in the choice and collection of medicinal plants. The greater number of writers recommend that such plants should be collected in those places where they grow wild, under the belief that if they are removed from their natural habitats, they will but rarely find in their new ones those conditions which are necessary for their complete development; and that, hence, they will languish, become sickly, and will not possess in the same degree the properties which they had in their natural states, and the medical practitioner would therefore have to deal with doubtful and variable agents, in which he could place no confidence.

"It must not be imagined that this decision in favour of wild plants has been arrived at hastily, or without proofs: on the contrary, it rests on certain scientific data, which the labours of modern physiologists have confirmed. Thus, if we cast an attentive glance upon the distribution of plants over the surface of the globe, we shall be struck at once with their number and variety, and if we search for the causes of such variety and for the evident preference of certain plants for particular localities, we shall see that they obey those influences in which heat and light have the greatest share; it is in fact by them that the seasons affect the climates, which have, in their turn, so powerful an action upon vegetation. It is heat and light which increase or diminish the respiration, circulation, absorption, and exhalation of plants; in fact, it

s to their influence that vegetable secretions owe their peculiar tastes and odours. A plant, says M. Alph. de Candolle, is a living machine working under the influence of two external agents, heat and light, and one internal, life. He observes, at the same time, that the old botanists ascribed to these two agents a still greater influence, for they looked upon plants as thermometers, the degrees of which were marked by the phenomena of vegetation.

"It is also by heat and light that we explain the preference of some plants for certain latitudes, certain climacteric zones which they do not go beyond; it is also by them that we account for the presence of a great number of species at particular heights above the level of the sea, from whence they neither ascend nor descend without destroying themselves or their progeny. It is also to these two agents that we must attribute the fructification of certain species in a given spot, a fructification which cannot be produced if such plants be placed in colder regions; such are, for example, the olive, jujube, etc.

"To these and other causes of a purely physical character, we might add those of a chemical nature, for although these have been altogether denied by some writers, they have, nevertheless, a great influence upon the distribution of plants over the earth. All botanists, for instance, know the preference of certain species of plants for silica, chalk, etc.; of others, for mixed rocks and gravel, etc. Those species, again, which inhabit swampy or turfy ground; those which select stagnant and warm waters, or those which choose running and cold streams; and those which spring up in the woods, meadows, or upon walls, ruins, etc., are not placed in such situations by chance and without appreciable causes. Again, without referring to parasitic plants, examples of a more extraordinary predilection have been noticed,—such, for instance, as are presented to us by alternating plants—namely, those which appear in certain soils for one or two years, then disappear to return again and again disappear; thus obeying some particular physical and chemical influences which are necessary for their development.

"The study of the physical and chemical causes which are concerned in the distribution of plants over the earth constitutes the science of Botanical Geography. It is upon the data furnished by this science and upon some very conclusive physiological experiments that the selection of medicinal plants should be based if we desire to obtain efficient remedies; such, at least, is the design of pharmacologists when they advise the employment of wild plants, for they think that when they are obtained growing under other conditions, that is, when in a state of cultivation, they have lost a great portion of their medicinal properties.

"It is unnecessary for us to refer here to the various modifications which the use of simples in medicine have undergone, or to the value of the more or less whimsical notions which led to the mixture of many obscure remedies with those of undoubted medicinal value. It is sufficient for us, at the present time, to show that a great number of plants do possess valuable medicinal properties, which render their use of great importance in the treatment of many diseases; and that, from their frequent and daily employment, a great increase in the commercial value of several of them has resulted. Hence has arisen the idea of submitting such plants to cultivation in the same way as is done on a large scale with those species which are employed for food or forage. Such attempts were at first made on a small scale, but in a short time horticultural establishments arose on all sides in which were cultivated all our indigenous plants employed in medicine, from the digitalis, belladonna, aconite, etc., to the mullein and common red poppy. These productions more developed, more fattened, if I may so speak, by cultivation, sell, on account of their better appearance, etc., at much higher prices than the same obtained in a natural state.

"In these establishments all the plants are grown together without any previous investigation as to whether the soil be favourable or otherwise; whether the situation will injure the development of their active principles, or whether the height of the position which these plants prefer will not result in modifying their properties; nothing of all these matters is considered. Those persons who make such speculations are most frequently strangers to the pharmaceutical profession, do not suspect the importance of these questions, nor the great injury they cause thereby to the public health; they sell their productions as gardeners sell their vegetables; the profit they obtain largely re-

pays them for their labours; they have attained their object; they care for little beyond they are not responsible for the injury produced. Nor is this all, for, to increase the profit as much as possible, they subject some plants, such as peppermint, balm, belladonna, stramonium, to the same periodical cutting as is practised in the cultivation upon a large scale of forage plants in our fields, without considering in the least whether such treatment, which does not give the plants time for elaborating their active principles, will not considerably impair their medical properties. We have known, since the time of Daubenton, that the young shoots of aconite and hemlock may be eaten with impunity, while the full-grown and mature plants of the same species are poisonous. We know also that many labiate plants, such as mint and balm, contain most bitter and volatile principles when in flower.

"Thus, the scientific edifice upon which *materia medica* rests is falling to decay; it is thus that the minute observations amassed during many ages of experience by learned men who have sacrificed their time and their labours to the relief of humanity, disappear.

"Taking the above facts into consideration, the Society, whose organ I am this day, has decided to put to the assembly the subject: *Of the influence of cultivation upon medicinal plants.* We are especially desirous that to the data already acquired by science and well known to all, may be added chemical, pharmaceutical, and clinical experiments, in order to determine in a material and irrefragable manner the real and comparative values of wild and cultivated plants, so as to put an end to the vagueness and confusion which the practitioner meets with when he wishes to employ any medicinal plant. It is on this ground that the Society invites practitioners desirous of proving their zeal for science, to lend the support of their experience to therapeutics and pharmacology, in order to enlighten the medical world upon a state of things which tends to lead the physician astray, as well as to compromise the health of his patients."

In presenting the above abstract to our readers we must beg them to notice that we do not endorse all the statements therein made; those more particularly which have reference to the cultivators of medicinal plants in France, are most certainly not applicable to the very intelligent body of men who devote their time, abilities, and money to the cultivation of such plants in this country. Nevertheless, the paper is eminently suggestive, and the statements of its author should be carefully considered by all who take an interest in the growth of medicinal plants. The opinion entertained upon the comparative medicinal activity of wild and cultivated plants by the framers of the London Pharmacopœia is, "that the herb which grows spontaneously in hedges and in uncultivated places, is to be preferred to that cultivated in gardens." At present, however, it must be admitted that no satisfactory evidence can be adduced of the greater activity of wild plants; indeed, Dr. Christison states, that "from experiments made some years ago at the Royal Infirmary in Edinburgh, with henbane, the inferiority of cultivated plants, if it exists at all, seems not appreciable in practice." According to Mérat, however, the superior activity of wild henbane has been demonstrated in Germany. Further experiments upon the comparative activity of wild and cultivated herbs are therefore required before we can arrive at any positive conclusions upon the subject. With regard to valerian, however, we entertain no doubt as to the greater activity of the wild herb.

The following extract from *Bentley's Manual of Botany*, page 785, has also direct bearings upon the matter in question. Thus, after alluding to the effects of the varying intensity of heat, light, etc., upon the formation of the secretions of plants, Professor Bentley says:—"At present, much remains to be discovered before we can be said to have anything like a satisfactory explanation of the causes which influence the formation of the secretions of plants; for it is found that the same plants when grown in different parts of Great Britain, where the climatal differences are not strikingly at variance, or even at the distance of a few miles, or in some cases a few yards, frequently vary much as regards the nature and activity of their peculiar secretions. A striking illustration of this fact is mentioned by Dr. Christison, who found that some umbelliferous plants, as *Cicuta virosa* (Water Hemlock), and *Œnanthe crocata* (Hemlock Water Dropwort), which are poisonous in most districts of England, were innocuous when grown near Edinburgh. The causes which lead to such differ-

ences are at present obscure, but the varying conditions of soil and moisture under which such plants are grown, have doubtless an important influence upon their secretions. In a pharmaceutical point of view, so far as the active properties of the various medicinal preparations obtained from plants are concerned, this modification in the secretions of plants by such causes is of much interest, and would amply repay investigation, for it cannot be doubted but that each plant will only form its proper secretions when grown under those circumstances which are natural to it, and that consequently any change from these conditions will modify to some extent the properties of the plant. I cannot but believe that here we have an explanation, to some extent at least, of the cause of the varying strength of medicinal preparations obtained from plants grown in different parts of this country, or in different soils, etc."

If future experiments should demonstrate in a conclusive manner that wild plants are more active than those under cultivation, it will be necessary to ascertain what are the conditions of heat, light, exposure, soil, moisture, etc., which are most favourable to the full development of the medicinal properties of each plant, in order that the cultivator may place them, as far as he is able, under such conditions. Many of our medicinal plants are now employed so extensively that they could not be obtained in any proportion to the demand for them from wild localities, and hence cultivation must be resorted to to keep up the necessary supply. In conclusion, we would urge upon our cultivators of medicinal plants to study to place the plants they cultivate in, as nearly as can be ascertained at present, their natural condition, and then we have no fear that their medicinal properties will be sensibly diminished; indeed, we see little reason to doubt, that as our knowledge of vegetable physiology and chemistry increases, when the conditions under which the different secretions of each particular plant have been thoroughly investigated,—we may increase rather than diminish their active properties by proper cultivation.

ON A NEW METHOD OF ESTIMATING TANNIC ACID.

BY M. K. HAMMER.*

The density of solutions of tannic acid has already been employed as a method of determining the quantity of that acid that they contain, but it is applicable only in the case of a solution which is pure. M. Hammer proposes a method which is available when the solution, as is almost always the case, contains other substances as well as tannic acid.

To accomplish this, he commences by ascertaining the density of the liquid in the state in which he finds it. He then effects the precipitation of the tannic acid by agitating the liquid with animal hide reduced to powder by means of a rasp; four parts of hide are used for one of the tannic acid which, judging from the sp. gr., the liquid is presumed to contain. This operation completed, the density is again determined; and the difference of the two results shows how much is due to the tannic acid. The densities at 59° F. of solutions containing from one 1 to 10 per cent of pure tannic acid is given in the following table:—

Tannic acid in 100 parts.	Sp. gr. at 59° F.
1	1·0040
2	1·0080
3	1·0120
4	1·0160
5	1·0201
6	1·0242
7	1·0283
8	1·0325
9	1·0367
10	1·0409

* Journal de Chimie Médicale, December, 1861.

TASTELESS PILLS.

TO THE EDITORS OF THE PHARMACEUTICAL JOURNAL.

Gentlemen,—In Mr. Banner's paper on pill-coverings, read before the Liverpoo Society of Chemists, and reported in last month's number of the Journal, I observe that he speaks of a modification of my process for rendering pills tasteless, as being superior to the process itself; and he there describes a method of coating pills, that I, many months ago, not only found *not* to answer the purpose of making pills tasteless, but of making them *useless*, at least, so useless as not to be presentable to the public. The method, he says he finds the best, only shows me how little he has experimented on the subject, and how rapidly he has arrived at conclusions. If he had kept the pills coated in the way mentioned a few days (a *few hours in summer-time*), he would have found the pills so full of cracks as to be quite tastable, and so unseemly as to be unsaleable. Tragacanth cannot be employed successfully in larger proportion than that mentioned as being employed in my process.

I pass over the want of originality displayed in combining a portion of two different processes to make a useless modification; but as it is in my power to prohibit Mr. Banner from using tragacanth "for the purpose of rendering pills tasteless," I shall be happy to hear that he has been successful in any method not infringing my rights.

I am, etc.,

R. C. FURLEY.

MISCELLANEA.

Explosion of Paraffin.—On Monday, January 13, Mr. Humphreys, one of the coroners for Middlesex, resumed the inquiry into the circumstances of the accident which occurred at Great College Street, Camden Town. The evidence adduced at the former adjourned meetings will be found in our last number, page 388. James Wright, the carman, who was injured, and who is still in the University College Hospital, was examined. He stated that the deceased held the candle not nearer than four or five inches to the fluid he was pouring off, so that it must have been the vapour given off by the oil, and not the oil itself which exploded. Dr. Harley, Professor of Medical Jurisprudence at University College Hospital, stated, in a report which he laid before the jury, that paraffin, properly so called, does not at ordinary temperatures give off vapour which will form an explosive mixture with atmospheric air, and that a lighted match may be applied to it without setting it on fire; its qualities in this respect being those of the ordinary animal oils used for lamps. Unfortunately, however, there are, he stated, oils imported chiefly from abroad and sold as paraffin, which have very different properties. These oils, if shaken, give off at ordinary temperatures a vapour which, if mixed with air in certain proportions, explode on the approach of flame. The examination of specimens of the oils sold by Messrs. Wills and Co., who were alleged to have supplied the oil in question, showed that they were not explosive. The examination, on the other hand, of a substance provided by Mr. Masters as resembling that which had caused the accident, showed that it possessed the properties of the explosive and spurious oils. The system of adulteration and substitution now extensively practised among English dealers was a most dangerous one, substances being now sold habitually under the name of paraffin, which are not less dangerous from their explosive properties than gunpowder itself. The jury pronounced a special verdict to the effect:—"That the deceased died from injuries caused by the explosion of vapours thrown off from certain oil called 'paraffin oil;' that pure paraffin oil is not explosive, but that a spurious and noxious article is largely sold as such, to the extreme danger of life and property; that some Legislative measures should be adopted to protect the public safety; and the said jurors do lastly say the oil that did explode was not of the same character as that sold by Messrs. Wills and Co."

A correspondent of the *Times*, Jan. 17, states that a young man was reading with his sister by the light of a paraffin lamp, when the lamp suddenly and without any apparent cause, exploded; the paraffin flew all over the poor fellow, and enveloped

him in a sheet of flame. He, fearing his sister's clothes would be ignited, rushed into the street, where the flames were put out by two passers-by, not, however, before the man had been severely burnt, and was then lying in a precarious state. The writer thought it right to warn the public of the risk incurred in using lamps of that description.

The following communication on the explosive property of paraffin has been addressed to the editor of the *Times*, by Mr. William Herapath, Professor of Chemistry, Bristol:—"So many accidents have occurred from the explosive character of an oil that has been sold as paraffin or petroline, that I think it advisable to make the public acquainted with an easy method of proving whether the oil is dangerous or not. Let two or three drops of it be allowed to fall upon a plate or saucer, and apply to them a lighted match; if the flame spreads over the surface of the drops the oil should on no account be used, as it will under many circumstances prove explosive. The genuine paraffin or petroline will not burn except upon a wick.

Poisoning by Nitrous Fumes.—On January the 8th, two men, named Marcoux and Sevas, employed in a manufactory of chemical products at St. Denis, were found dead in the street a short time after they had quitted the establishment. A medical man, who saw the bodies, declared that death had been occasioned by their having been too long exposed to the fumes of azotic acid. The bodies were taken to the Morgue to undergo further examination.—*Times.*

Anarcotine.—Under this name, *Narcotine* is described in an article on "New Remedies," in the 'Lancet' of January 11. The author states that the name of "narcotine" having been applied to one of the crystalline constituents of opium, under the erroneous impression that it was the narcotic principle of that drug, and as it has not the slightest claim to that title, it is very properly proposed to prefix the privative letter *a* to the name, and henceforth designate it as *anarcotine*. It is recommended as a powerful antiperiodic in the place of quinine, on the authority of Dr. Roots, Dr. O'Shaughnessy, and Dr. A. Garden.

The Oil-Springs of America and Canada.—The following is an abstract from the circular of Mr. A. S. Macrae, of Liverpool, published in the 'Times' of December 18:—"Petroleum, Kerosine, Photogene, or Rock and Well Oil.—If the rocks and wells of Pennsylvania, Canada, and other districts continue their exudation at the present rate of supply, the value of the trade in this oil may even approach that of American cotton. Montreal (internally, and perhaps externally by this time) is lighted with the white refined. The oil gas distilled from the raw petroleum is superior, and much more brilliant than our own coal gas. For years we have sent coals to America for her gas-works, and it will be a singular freak of events if she and Canada should now supply us with a better expedient. The merits of the petroleum will be better understood when importers are informed that besides the uses already named, lubricating oils of every colour and specific gravity can be obtained from it; wax also, for the manufacture of paraffin candles; naphtha, and consequently benzole, pitch, etc., all of them having several other applications. It is reported that an available substitute for spirits of turpentine for paints, and also a solvent for india-rubber, have been obtained from it A quantity of no less than twenty thousand barrels is said to be on its way to this country."

Scientific Nomenclature.—Mr. F. W. Griffin, of Bristol, in a communication to the 'Athenæum,' December 21, with reference to an improved system of scientific nomenclature, observes that the names assigned to complex organic compounds would not look half so formidable if they were printed like other compounded words, that is divided by hyphens into their separate elements as they have to be pronounced. Such names as trimethyltriethylethylenephosphammonium, succinylbisulphophenylbibenzamide, become intelligible, and can be read off at a glance, if separated into the simple words of which (in German fashion) they are built up; thus,—trimethyl-triethyl-ethylene-phosph-ammonium; succinyl-bisulpho-phenyl-bibenzamide.

Comparative Weight of Drops of various Fluids.—From the results of numerous experiments as to the comparative weight of the drops of various fluids, by M. Reveil, the following examples are given. To obtain a weight of 1 gramme, the following liquids require these different numbers of drops:—Distilled water, 20; sul-

phurie acid, density of 1·843, 32; chloroform, density of 1·480, 58; tineture of digitalis, 59; Sydenham's laudanum, 37; solution of sugar, 40 per eent., 20; essence of turpentine, 55; and eroton oil, 49. The inference drawn is, that all liquid medicines should be preseribed by weight.—*Bull. de l'Acad., October, p.* 78. [The relation between drops and minims (by measure) has been investigated by Mr. Barnard S. Proctor, in this Journal, Vol. II. Seeond Series, p. 20.]

Attempted Suicides by Laudanum.—At the Southwark Police Court, Richard Laws was brought before Mr. Burcham, charged with taking a quantity of laudanum with intent to eommit suieide. On Saturday, November 30, the prisoner was found by a polieeman lying on the steps of a door in Tooley Street, in a state of uneonsciousness, and was eonveyed to Guy's Hospital. A phial whieh had reeently eontained laudanum was found in his poeket. The prisoner stated that he had been in the Indian Navy, and that circumstanees had occurred whieh induced him to drink more than usual. He admitted taking the laudanum, but said he had no intention to eommit suicide.—At the Clerkenwell Police Court, Deeember 5, Caroline Clarke, aged twenty-six, was brought up on a similar eharge. The prisoners, in both eases, were remanded.

Deaths from Chloroform.—On Wednesday afternoon, Deeember 11, an inquiry was instituted before Mr. G. S. Brent, the deputy eoroner for West Middlesex, touching the death of Charles Ellwood Ashton, aged nineteen, a medical student, aeting as dispenser at the Notting Hill and Shepherd's Bush Dispensary. Edward Tunstill, porter to the institution, said the deceased had been dispenser from May, 1860. He dined with him on Saturday last. He was eheerful and in excellent spirits, and there was no reason to expeet his death. He told witness that he took ehloroform, as he liked the sensation. After dinner he went upstairs into his bedroom and loeked the door, as was his eustom. Witness went out, and on his return, about half past five, he ealled him, but received no answer to his loud knoeking at the door. Witness then ran to the dispensary for the ehloroform-bottle, and found it missing. His wife and himself then went up to the door, and, again receiving no reply, they sent for Mr. Cole, a neighbour, and Dr. Jackson. The door was broken open, when the deceased was found lying on the bed, dressed, with a eap and pockethandkerehief over his face. The handkerehief was inside the eap, and appeared to be saturated with ehloroform. He never threatened to commit suieide, and always appeared eheerful. He said he should go to sea if he did not pass his examination. Robert Jackson, M.D., and medical superintendent to the dispensary, deposed that, when he saw the deeeased after the fatal aeeident, he had a eap and handkerchief fastened tightly over his face, the elastie band of the eap being over his head. There was a bottle of ehloroform, from which he should imagine four drams of ehloroform had been taken,—perhaps seareely so much. The limbs were eold and rigid. The *post-mortem* examination revealed extreme rigidity. There was no disease to account for death. He knew the deeeased was in the habit of taking ehloroform. Several witnesses were then examined, with the view of aseertaining if suieide was intended. It appeared that the deeeased had £30 per annum from the institution, received small remittanees from his uncle, and was not known to have been short of the neeessaries of life. The jury unanimously found that "Death was produced by an overdose of ehloroform, but whether suieidally intended or otherwise there was not sufficient evidence to prove."

Another inquest has been held, by Mr. Brent, on the body of Charles Gibbs, who, whilst intoxicated, met with an aeeident by which one of his ankles was fractured. On being taken to University College Hospital, it was thought necessary to administer ehloroform during the operation to be performed, and under its influenee he died. Verdiet, "Aeeidental death from ehloroform administered in a surgical operation."

Alleged Death from Poison.—On Wednesday, January the 8th, an adjourned inquiry was held before the eoroner, at the Brieklayers' Arms Tavern, relative to the death of Caroline Barratt, whose death it was alleged had been eaused by the administration of poison. Dr. Godfrey, of Finsbury Square, who had been ealled in by the friends of the deceased, gave it as his opinion that she was being slowly poisoned. Death took plaee on the 1st of November last. Dr. Letheby detected a small portion of lead in the intestines, but not sufficient to cause death. Mr. Wallace, who attended

the examination of the body, said that lead was not an irritant poison. Mr. Halford, another medical gentleman, said the deceased died from the effects of typhoid fever. Mr. Barratt handed in a written statement of the case. It contained full contradictions to the allegations set forth in the first evidence, and declared that the rumours were gross fabrications. After the production of further evidence, the coroner summed up, observing that the case was shrouded in great mystery. The jury returned the following verdict—"That the deceased died from the mortal effects of an irritant poison, but whether taken by herself, or administered to her by any other person, there was no evidence before them to prove."

Charge of Administering Poison.—At Stafford, December 2, (before Mr. Baron Martin,) William Yales, 22, labourer, was charged with administering poison to his illegitimate child, Charles Dawson, with intent to murder it, and also with intent to do it some grievous bodily harm, at Abbots Bromley, on the 24th of November, 1861.

Mr. J. E. Davis conducted the prosecution: Mr. A. S. Hill defended the prisoner.

It appeared that the prisoner had had an illegitimate child by a young woman, named Ellen Dawson, and the latter had obtained an affiliation order, under which the prisoner was required to pay towards the child's maintenance. It was proved that the prisoner had acted with cruelty towards the child (about twelve months old), and on the morning of November 24, the child was left in bed with the prisoner, and in a few minutes it was heard to scream, when the mother rushed into the room, she found her child, black in the face, and in apparent agony, with froth coming out of its mouth. A doctor was sent for, and the mouth and throat were excoriated, but the child recovered, as it did not appear that anything had been swallowed. On further inquiry, it appeared that the prisoner had thown away a bottle containing the remains of one drachm of spirit of ammonia, and four drachms of tincture of henbane, which he had purchased at a chemist's.

The jury found the prisoner *Guilty* of administering the poison with intent to do grievous bodly harm.

Mr. Baron Martin, in passing sentence, said the prisoner had been convicted of a most atrocious crime, for which his Lordship sentenced him to ten years' penal servitude.

REVIEW.

HOUSEHOLD MEDICINE: containing a Familiar Description of Diseases, their Nature, Causes, and Symptoms; the most approved Methods of Treatment; and the Properties and Uses of Remedies, including many New and Valuable Medicines, with Directions for Preparing them; and Rules for the Management of the Sick Room. Expressly adapted for Family Use. By JOHN GARDNER, M.D., of the Royal College of Physicians, Edinburgh; Author of 'The Great Physician;' Editor of 'Liebig's Letters and Lectures on Organic Chemistry.' Late Professor of Materia Medica and Therapeuties to the General Apothecaries' Company, etc. With Numerous Illustrations. 8vo, pp. 520. London: Smith, Elder, and Co., 65, Cornhill. 1861.

The author of the above volume, the title of which we have given *in extenso*, holds the opinion "that the non-professional reader is as likely to be right in detecting and suspecting certain diseases, as most medical men." And impressed with this belief, he has produced a book, the aims of which are—(1) To describe diseases in such a manner that they may be readily recognised and distinguished by a non-professional reader: and (2) To point out 'the remedy or method of treatment best adapted to the relief or cure of diseases, so far as it may be properly and safely applied by the master or mistress of a household." To this the author adds:—

"It is not intended to encroach upon the proper provinces of the physician or sur-

geon; but accidents occur and emergencies arise where instant interference is imperatively needed; and a correct knowledge of remedies, and the method of using them in such cases, will obviate incalculable mischief and suffering. Moreover, slight maladies, or what are considered so, always have been, and always will be, subjected to some kind of treatment irrespective of professional advice: and it is obvious that the guidance of science and experience must be preferable to hap-hazard practice, or the casual suggestions of persons not themselves well informed."

If our author had confined himself to a brief notice of slight ailments, and a few of the more important remedies in common use for the relief or cure of diseases together with a few hints on the mode of proceeding in case of emergencies and accidents, we should have taken but little exception to his volume. On the contrary, we believe that the general public will derive very great benefit by being informed in a popular manner upon such matters; as also by being instructed in the leading facts of anatomy and physiology,—on nursing,—construction, arrangement, and management of the sick-room,—nature of diet and dietetic substances,—and other matters of a like nature. Dr. Gardner, however, is not content with giving information upon such subjects only, but he has endeavoured also to explain to non-professional readers, the nature, causes, symptoms, and treatment of all the diseases of the human body, and the general properties, nature, and doses of the many remedies employed for their cure or alleviation. Thus, among the diseases described by him for domestic practice, we find the following:—inflammation of the bladder, stone in the bladder, diabetes, angina pectoris, pleurisy, brain affections, small-pox, pericarditis, syphilis, etc., as also the management of labour, and general directions for the treatment and diagnoses of diseases of the eye, ear, teeth, etc. In fact, it would appear from Dr. Gardner, that if Paterfamilias would but attentively read his volume, he would very rarely find it necessary to call in a regularly qualified medical practitioner; for he might be his own family doctor, and act, as occasion might require, indifferently as physician, dentist, or accoucheur; indeed, in some cases he would most certainly be in advance of the orthodox members of the medical profession, for Dr. Gardner makes the following statement:—"We unhesitatingly say that consumption is curable." In fact he does not despair altogether of curing any disease, as "it appears by no means improbable that a remedy is at length in our possession, capable, at least, of staying for a time the progress of cancer," and he also states, "it ought to occasion no surprise if we should express the conviction that no disease will hereafter be deemed incurable."

Although Dr. Gardner thus believes that he can as a general rule educate the public to treat themselves, he cautions them when they are compelled to call in further aid, not to resort on any account to the chemist and druggist, for he says:—"Before a qualified practitioner is called upon, the druggist, confessedly destitute of a medical education, is too often consulted; when diseases of an acute character make their attacks, time is thus lost when the emergency could have been best met and counteracted, while chronic diseases become established." Shortly afterwards, he states, that there should "be a perfectly free trade in physic; abolish all legal privileges, let colleges, halls, and all similar institutions be placed on the same footing as the Royal Society, or the other societies voluntarily formed for promoting the progress of science;" [!] and he then recommends that the future medical practitioners "should supply to the patients the necessary medicines, at least without payment; keeping an entire control over what they recommend for the treatment of disease." To this he adds, "when a prescription is written, and committed to the patient, the probability is very great in many cases that the principal ingredient is not obtained; so that patient and physician are alike deceived." The recommendations and suggestions in the above paragraphs are so palpably absurd, and the insinuations of the latter so utterly unworthy of a professional man, that we do not deem it necessary to comment upon them further. It is quite clear that high as Dr. Gardner places his own capabilities for teaching the public, he entertains a very mean opinion of the abilities, and honourable dealing of many dispensing chemists. In a future part of his work, however, remembering we presume his former connexion with a trading drug company, as he has styled himself, *Late Professor of Materia Medica and Therapeutics to the General Apothecaries' Company*, in Berners Street, he has given some very sensible advice: thus, he says, "All medicines should be obtained from a respectable druggist, and the

price disregarded. The cost of the very best drugs and chemicals is for the most part trifling; and usually when an article is expensive, the quantity employed is small."

After treating of the various diseases, the author proceeds to describe the nature, properties, and doses of the different remedies employed for their cure or relief, which are in use by orthodox physicians and others. In this portion of the work the author attributes very high value to the so-called Eclectic Medicines from America, and although we by no means go so far as Dr. Gardner does in this matter, yet we also think that some of them are valuable remedies, and will soon be more resorted to by the medical practitioners in this country; and to further this end, we intend shortly to bring prominently before our readers some of the more important of them. Highly however as we may estimate these remedies, as most of them are not to be obtained at present in this country at all, and scarcely any except in very small quantities, we think their constant recommendation should have been avoided in a treatise on "Household Medicine." While our author has thus expressed a firm belief in the value of many new remedies, he holds some of those now in constant use in very small esteem; thus speaking of *ergot*, he says, "In our opinion, some good nourishment, such as beef tea or broth, administered hot, is far better and more efficacious." What will writers who regard ergot "as an agent specifically exciting internal contractions" say to this?

After describing the nature and properties of the various remedies, our author gives a list of medicines, and utensils necessary for their proper preparation and administration; these he recommends to "be kept in every household, for domestic use or to be at hand in emergencies for the professional adviser." This part concludes with a list of prescriptions, family receipts, and preparations; which the author states he has "no hesitation in designating a valuable collection."

We have no desire to be hypercritical, and to look out solely for blemishes, for we hold that a reviewer has a higher duty to perform than to search for errors, and therefore we gladly admit that the part of the work which treats of the nature and properties of remedies, etc., appears generally to have been compiled with care, and to contain some useful matter, but at the same time, we must add, that we regard it as too comprehensive in its design for the use of non-professional readers. We feel obliged, also, to point out some errors even here; because a book which professes to give the non-professional reader a systematic and accurate knowledge of the properties and nature of both old and new remedies, should not call the *fruits* of the carrot, coriander, fennel, and other plants of a like nature, *seeds;* nor the *corms* of *Arum maculatum*, and the rhizomes of the ginger-plant, *roots;* or lead the reader to infer that catechu is only derived from species of Acacia; or say positively that rhubarb is obtained from *Rheum palmatum;* or commercial styrax from *Styrax officinale*, etc. Neither should such errors of spelling occur as Galepea, Creneta, Centaurum, Curcumis for Cucumis, capaifera, Cubebe, Felix-mas, Marubium, Pariera, maratima, Urse-Ursi, Veratrea, Chimaphilla, Gillenea, Leptandria, Scutellaria, Opulis, Aspardia, Tornatilla, Galeim Aperine, and a number of others.

The fourth and concluding portion of the volume contains chapters on the anatomy and physiology of the human body, and on diet and dietetic substances. These generally may be consulted by the non-professional public with advantage; although some of our readers will, we think, take exception to such statements as the following:—"London butter, supposed to be fresh butter, oddly enough, has so good a reputation that it is largely distributed and sold throughout the country, especially in towns. It is manufactured by incorporating beef suet or mutton suet, after being melted and strained, with a varying proportion of butter, according to the season. I know," says our author, "no objection to this as an article of diet, except the fraud of charging the price of butter for a substance about one-half its value." Again, "Tea ought to be boiled for about two minutes in the water. It thus yields far more soluble matter, and loses nothing of its aroma, which is not very volatile; indeed, tea so prepared, has a stronger odour than when made by a simple infusion." Again, listen to this, you smokers, and take heart accordingly, for you have received much abuse lately,—"In middle age, and later in life, to the majority of men constituted as the world is, we regard the peculiar properties of tobacco as a most striking and beneficial provision of Providence. We doubt indeed whether, without tea, coffee, and tobacco, the civilization of modern nations would have been attainable." Also, he adds, "We believe

that more disease is caused by bad bread than by tobacco." We should have hesitated also in incorporating, in a chapter on dietetic substances, in a work on household medicine, the statement that *Salep* or *Saloop* is derived from *Orchis mascula*, *O. morio*, *O. militaris*, *O. fusca*, *O. bifolia*, *O. latifolia*, *O. pyramidalis*, *O. hercina*, *O. maculata*, *Ophris anthropophora*, *O. apifera*, *O. arachnites*. Such a parade of scientific names can have no good effect, and more especially so when at least three out of the number are incorrectly spelt.

We wish we could have spoken more favourably than we have been able of our author's labours, for a good book on Household Medicine has long been a desideratum. The present work, in our opinion, by no means supplies that want; for the author has here attempted too much, and has thus produced a volume which is far too abstruse and comprehensive for general readers, while it is at the same time not sufficiently precise for the medical practitioner or pharmaceutist. Even the useful matter it contains is so mixed up with that which is doubtful or erroneous, and with such absurd and extravagant recommendations, that much of the value that might otherwise arise from its perusal, is destroyed.

TO CORRESPONDENTS.

Adulteration of Tinfoil.—We have received the following communication on this subject:—

Sir,—In reference to Mr. Baldock's communications contained in your present number, I beg to observe that I published a paper in the 'Chemist' for July, 1857, where, in the very first page, I called the attention of chemists to the subject from circumstances which came under my notice. Indeed, Messrs. Adams subsequently prosecuted the manufacturer for a supposed breach of contract, but the case failed, as no guaranty or warranty of absolute purity was given.

I am, Sir, yours, etc.,

JOHN HORSLEY, F.C.S.,

The Laboratory, Cheltenham. Analyst to the County of Gloucester.

J.A.W.—(1) A per-salt of iron produces a blood-red colour in infusion of white mustard-seed, but simply a somewhat tawny hue in that of black mustard. (2) See any manual of chemistry.

P. J. Q.—Answers to questions 1, 2, and 3, will be found at page 346 of our last number. (4) See Vol. XI. page 344.

F. P. (Birmingham).—*Ammoniated Solution of Quinine.* The formula has been given repeatedly; it will be found in Vol. XIII. page 344.

P. M. (Jersey).—Persons unconnected with the Pharmaceutical Society, may obtain the Journal through any bookseller, and on the usual terms.

A Constant Reader (London).—(1) *Benzoë*, the former pharmaceopœial name of benzoin. (2) Benzoic acid; Ger. *Benzoesäure.*

Chemicus (Torquay).—The deposit in *Syrupus Ferri Superphosphatis* consists of phosphate of iron; the use of a little more acid would remedy the defect.

M. P. S.—*Process for Coating Pills.* See Mr. Furley's letter on the subject, p. 434.

A. H. (Dorking).—(1) We should think not. (2) No.

J. Davis.—We are obliged for the information, and will probably use it in our next. Want of space has prevented our doing so in the present number.

A Subscriber.—We are not acquainted with the work.

T.F.E.—In our next.

ERRATUM.—Page 373, for Mr. A. Redford, read Mr. Joseph Redford, Kiama, New South Wales.

Instructions from Members and Associates respecting the transmission of the Journal, before the 25th of the month, to the Secretary, ELIAS BREMRIDGE, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. CHURCHILL, New Burlington Street. Other communications to the Editor, 17, Bloomsbury Square.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. III.—No. IX.—MARCH 1st, 1862.

THE INTERNATIONAL EXHIBITION OF 1862.

United Exhibition of Drugs and Pharmaceutical Preparations.

The Committee appointed by the Council of the Pharmaceutical Society are making satisfactory progress in carrying out their object. A considerable amount of space has been allotted to them, and as the time for taking possession of it and sending in the specimens is drawing near, it becomes necessary to lose no time in completing all the arrangements.

The following regulations have been adopted by the Committee in addition to those previously published in the number of this Journal for November last, page 249 :—

1. No preparation will be admitted for exhibition in this collection unless it be contributed by the *bonâ fide* manufacturer.
2. Specimens of drugs as imported will be exhibited, as well as preparations.
3. Specimens for exhibition cannot be received until notice in writing, with a list of the articles intended to be exhibited, has been given to the Secretary, and an answer accepting them returned by him.
4. All specimens for this collection must be sent, not later than the 15th of March, to 17, Bloomsbury Square, addressed to the Curator, Mr. Garle, so that they may be classified and arranged for exhibition.
5. The specimens will be considered the property of the contributors, and will be returned to them on application after the exhibition ; but the Committee will not hold themselves responsible for damage to or loss of any such specimens.
6. The Committee do not engage to exhibit all the specimens sent to them, but to select such as in their judgment will most contribute to the objects of the Exhibition.*
7. All articles, both manufactured drugs and preparations, will be arranged systematically, under the direction of the Committee, and not grouped according to the makers or exhibitors ; and with the view of promoting uniformity, the size and shape of the bottles will be limited as follows :—

Tinctures, spirits, liquors, distilled waters, acids, syrups, etc., to be contained in

* Patent Medicines are excluded by authority of the Commissioners.

twelve-ounce white glass, round stoppered bottles, of the sort known as the "long pattern." Dimensions:—5 to 5¼ inches to the shoulder; 7 to 7¼ inches to the top of the stopper.

Essential oils, essences, liniments, etc., in four-ounce stoppered bottles, "long pattern." Dimensions:—3½ inches to the shoulder; 5 inches to the top of the stopper.

Ointments and cerates, plasters, extracts, and confections, in four-ounce white glass jars, with flat outside covers, long pattern. Height:—3¼ inches to the top of cover.

Powders, in four-ounce white glass bottles, long pattern.

Patterns of the several kinds of containing vessels and of the labels recommended may be seen at 17, Bloomsbury Square.*

A room has been set apart in the Society's house, 17, Bloomsbury Square, for the reception of specimens, and where exhibitors may inspect the collection before it is sent to the Exhibition building. While in the Society's house the Curator and Secretary will have charge of the specimens, and any alteration which may be found necessary in the labelling or otherwise will be here made under the superintendence of the Committee. It is desirable that uniformity should be observed, as far as possible, even in regard to labelling, and the Committee particularly wish to avoid unnecessarily large labels. They have indicated a plain line label as that which appears to be most appropriate for the names of the articles and also of the exhibitors, the former being placed on the upper part of the bottle and the latter at the bottom, in the usual way of labelling. No particular kind of type has yet been decided upon, but intending exhibitors will do well before getting labels printed to confer with the Curator or Secretary on the subject.

The following Subscriptions† have been received towards defraying the expenses of the Committee in providing the necessary fittings and attendance in connection with this Exhibition:—

A. Allchin, 6, Coles' Terrace, Barnsbury, £1. 1*s.*; Baiss, Brothers, 102, Leadenhall Street, £1. 1*s.*; J. Barnard, 31, Upper Gower Street, £1. 1*s.*; J. B. Barnes, Trevor Terrace, Knightsbridge, £1. 1*s.*; John Bell and Co., 338, Oxford Street, £1. 1*s.*; Professor Bentley, 17, Bloomsbury Square, £1. 1*s.*; W. L. Bird, 42, Castle Street East, £1. 1*s.*; Blake, Sandford, and Blake, 47, Piccadilly, £1. 1*s.*; Elias Bremridge, 17, Bloomsbury Square, £1. 1*s.*; John W. N. T. Brewer, 5, Liverpool Street, £1. 1*s.*; Alexander Bottle, Dover, £1. 1*s.*; H. B. Brady, Newcastle-on-Tyne, £1. 1*s.*; W. H. Bucklee, 86, New Bond Street, £1. 1*s.*; S. Darby, 140, Leadenhall Street, £1. 1*s.*; J. T. Davenport, 33, Great Russell Street, £1. 1*s.*; H. Deane, Clapham, £1. 1*s.*; George Edwards, Dartford, £1. 1*s.*; Evans, Lescher, and Evans, 60, Bartholomew Close, £1. 1*s.*; Evans, Sons, and Co., Liverpool, £1. 1*s.*; Fisher and Hasclden, 18, Conduit Street, £1. 1*s.*; J. Garle, Kilburn, £1. 1*s.*; D. B. Hanbury, Plough Court, £1. 1*s.*; Daniel Hanbury, Plough Court, £1. 1*s.*; Herring and Co., 40, Aldersgate Street, £1 1*s.*; Arthur S. Hill and Son, 11, Little Britain, £1. 1*s.*; T. H. Hills, 338, Oxford Street, £1. 1*s.*; John Horncastle, 12, Stanhope Terrace, £1. 1*s.*; Robert Howard, Stratford, £1. 1*s.*; John Mackay, Edinburgh, £1. 1*s.*; G. Meggeson, Wandsworth, £1. 1*s.*; T. N. R. Morson, 38, Queen's Square, £1. 1*s.*; Professor Redwood, 17, Bloomsbury Square, £1. 1*s.*; W. D. Savage, Brighton, £1. 1*s.*; P. Squire, 227, Oxford Street, £1. 1*s.*; T. Standring, Manchester, £1. 1*s.*; G. Waugh, 177, Regent Street, £1. 1*s.*

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* A plain line label, with the name of the substance in Latin, is to be attached to each specimen.

† P. O. Orders or Cheques may be made payable to Mr. Thomas Hyde Hills, Treasurer, 338, Oxford Street, W.; or to Mr. Elias Bremridge, Secretary, 17, Bloomsbury Square, W.C.

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *5th February*, 1862,

Present—Messrs. Bird, Bucklee, Davenport, Deane, Edwards, Evans, Hanbury, Haselden, Herring, Hills, Lescher, Meggeson, Morson, Sandford, Savage, Squire, Standring, and Waugh,—the following were elected

MEMBERS.

HIRWAIN .....George, John Evan.
EDINBURGH .....Allan, Bruce.
LUDLOW .....Wells, Edwin.
RAMSGATE .....Mohurn, Martin.

ELECTION OF THE COUNCIL.

The following Members of the Council were drawn by lot to remain in office for the ensuing year:—

Bird, William Lionel.....42, Castle Street.
Edwards, George .....Dartford.
Hanbury, Daniel Bell.....Plough Court, Lombard Street.
Haselden, Adolphus Frederick .....18, Conduit Street.
Herring, Thomas .....40, Aldersgate Street.
Morson, Thomas N. R. .....38, Queen's Square.
Savage, William Dawson .....Brighton.

SPECIAL MEETINGS OF THE COUNCIL.—*12th February.*

Present—Messrs. Bucklee, Davenport, Deane, Hanbury, Herring, Hills, Meggeson, Sandford, and Waugh.

19th February.

Present—Messrs. Bucklee, Davenport, Lescher, Morson, Sandford, Squire, and Waugh.

MAJOR EXAMINATION, *19th February.*

Applegate, Edwin .....Bradford-on-Avon.
Strawson, George Frederick .....Crewkerne.
Waites, Edward William .....Ross.
Tuck, John .....Trowbridge.

MINOR EXAMINATION.

Brayshay, Thomas .....Stockton-on-Tees.
Kitchin, William Henry .....Whitehaven.

REGISTERED APPRENTICES.

NAME.	RESIDING WITH.	ADDRESS.
Barton, Frederick George	Mr. Buzzard	Leicester.
Collier, Thomas	Mr. Collier	Sheffield.
Howes, Thomas Manning	Messrs. Greville and Taylor	Northampton.
Llewllyn, John	Mr. Lister	Cowbridge.
Rhodes, Francis	Mr. Ogden	Manchester.
Smith, Robert Ayre	Mr. Heming	Bishopwearmouth.

THE JACOB BELL MEMORIAL FUND.

SUBSCRIPTIONS RECEIVED SINCE THE LAST ANNOUNCEMENT.

	£.	s.	d.
Grindley, Robert D., Chester	2	2	0
Hawkins, Francis, M.D., 18, Bolton Street, W.	2	2	0
Hill, Arthur S., and Son, 11, Little Britain	10	10	0

PHARMACEUTICAL MEETING.

Wednesday, February 5th, 1862.

MR. PETER SQUIRE, PRESIDENT, IN THE CHAIR.

The following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced, and the thanks of the Society given to the respective donors:—

The Journal of the Society of Arts.
The Photographic Journal.
The Educational Times.
The Dental Review.
The British Journal of Dental Science.
The Technologist.
The Chemist and Druggist.
Quarterly Journal of the Chemical Society.
Répertoire de Chimie.
The Assurance Magazine. From the respective Editors.
Bulletin de la Société de Paris.
Bulletin de la Société Chimique de Paris. From the Societies.
Supplementary Remarks on German Yeast. By John Mackay. From the Author.
The Free Trade Question. By Mons. Marigny Mesnil. From the Author.
Dell' Acqua, sopra i Sali e sopra gli Acidi. By P. Peretti, Rome, 1861. From the Author.

Specimens of Materia Medica from Siam, viz.:—

Mangrove Bark.	Gamboge Seeds.
Catechu.	White Birds'-nests.
Sugar.	Black Birds'-nests.
Gamboge.	Betel nuts.
Bees'-wax.	

Presented by Mr. Cole.

Fine specimen of Crystallized Citrate of Lithia. From Messrs. Blake, Sandford, and Blake, accompanied with the following note:—

47, Piccadilly, February 5, 1862.

To the Curator of the Museum, Ph. Soc.

Dear Sir,—We send herewith a specimen of Citrate of Lithia for the Museum of the Pharmaceutical Society.

About two years since, when Lithia became a comparatively common medicine (by reason of the praise bestowed on it by Dr. Garrod in his Treatise on Gout), it occurred to us that a more manageable salt than the Carbonate, for ordinary dispensing, would be advantageous, and we therefore tried certain experiments to obtain one.

We made Iodide, Tartrate, and Citrate. The first, which we obtained in beautiful crystals, was so deliquescent that on exposure to the atmosphere it almost instantly lost its form and could only be kept in solution.

The second was a dry salt, readily soluble, and with little unpleasant flavour.

The third is before you; a neutral salt, rather inclined to efflorescence, extremely soluble in water and as nearly tasteless as possible.—Citrates being usually considered good in such cases as those to which Lithia itself is applicable, we adhered to this preparation, and it has been we believe since adopted by other chemists.

The usual form in which we keep this salt is a white powder; but crystals may be readily obtained, and the sample we send will be found in very beautiful clusters.

We are, dear Sir, faithfully yours,

BLAKE, SANDFORD, and BLAKE.

A packet of Dr. James's Powder, from Messrs. Bradley and Bourdas, accompanied with the following note:—

Messrs. Bradley and Bourdas beg to present to the Pharmaceutical Society a packet of James's Powder, bearing the signature of Fr. Newbery.

Some years ago they purchased a medicine-chest that had been made and supplied to the Prince of Wales, who afterwards became George IV.,—thinking, the charm of Royalty being attached to it, they would have no difficulty in meeting with a purchaser, but in that they have been disappointed. In one of the drawers were two packets of James's Powder, one of which is now presented, and must have been in the chest for seventy years or more.

The following Papers were read:—

ON THE NUTRITIVE VALUE OF DIKA BREAD.

BY MR. JOHN ATTFIELD, F.C.S., DEMONSTRATOR OF CHEMISTRY AT ST. BARTHOLOMEW'S HOSPITAL.

In December 1859, a specimen of Dika bread was presented to the Museum of the Pharmaceutical Society, by Mr. P. L. Simmonds. From a notice in the 'Journal de Pharmacie' (1857), tome xxxi. p. 275, it appears that this edible cake is prepared from the fruit of the *Mangifera gabonensis*, and that it forms an important article of food for the natives of the Sierra Leone district of the west coast of Africa.

In colour, odour, and consistence it so much resembles chocolate, or rather a compact mass of cocoa-nibs, that I was led to think it might be one of that interesting class of alimentary substances, the members of which contain caffeine or a homologue. Believing, at all events, that a knowledge of the centesimal amount of the nitrogenous constituents which exist in it would be interesting, I submitted a portion of the above-mentioned specimen to chemical examination. The result I now beg to communicate to the Society.

Though apparently very dry, Dika bread loses 5 per cent. of moisture on being placed for a few hours in a hot-water oven. At a temperature lower than 212° F., however, it softens slightly on account of the large quantity of readily fusible fat that it contains. Dr. O'Rorke, who wrote the French notice

already alluded to, states the percentage amount of this fat to be between seventy-nine and eighty, but on exhausting some of the powdered bread with benzole,—first by boiling them together for some time, and then, after filtering, well washing the residue with hot benzole, and finally evaporating the benzole solutions to dryness,—I could only obtain 66·0 per cent. In a second experiment, similarly conducted, one hundred parts yielded sixty-five of fat, the mean of the two determinations being 65·5. A specimen of this fat is now in the Society's Museum, for future reference. It is moderately hard, of slight odour, and liquefies when warmed to about 90° F. Its colour is a light brownish-yellow, but is probably due to impurity, and could no doubt be easily removed.

The large proportion of fat in Dika bread naturally suggests economic application, an idea that is greatly strengthened by the fact that the fruit, from which the bread is made, is most plentiful. M. Aubry-Lecomte, who first introduced Dika bread to the notice of Europeans, says that immense quantities of the fruit accumulate under the trees, and that, the natives not troubling to collect it, it soon is eaten by vermin or decomposed by the heat of the sun. To assure myself that the fat of Dika bread is really a constituent of the nut, and not subsequently added in making up this food, I carefully picked out some of the broken kernels which are so profusely distributed over the cake, and after freeing them of external coat, treated them as already described. The result indicated 68·4 per cent. Possibly the collection and exportation of these nuts, or at all events of the fat pressed from them by the aid of heat, would be remunerative to the natives of the Sierra Leone district, and advantageous to manufacturers who use raw material of that nature. The matter is however one for men of commerce to decide upon.

If Dika bread were analogous to cocoa, coffee, or that peculiar food-cake called *guarana* by the Brazilians, it would contain caffeine or a similar principle. Such an alkaloid being soluble in benzole, the fat, isolated as already indicated, would contain it, would yield it up on ebullition with water, and it would be deposited in crystals on the aqueous solution being evaporated. The experiment was tried, but no crystals were obtained, nor did the residue give any indications of such a principle on being minutely examined. That the process would have educed an alkaloid had one been present was proved by fusing half a grain of pure caffeine with twenty grains of the fat, and submitting the mass to the described treatment, when the caffeine was recovered in a pure state. The action of Dika bread upon the human system must then be essentially different from that of coffee, tea, cocoa, etc. Indeed, on looking at the very large amount of fat it contains, we are led to the conclusion that it must be one of those foods whose chief office is to directly contribute to the development of animal heat, and not one of that class whose members go through the intermediate stage of producing flesh. It more nearly, in fact, resembles the chocolate-like cake made in Spain by roasting and grinding the root of the *Cyperus esculenta;* or a similar food used in South Carolina and prepared from the *Arachis hypogæa*, or earth-nut.

The amount of nitrogen in Dika bread is also below that in coffee or in cocoa. Coffee, according to Stenhouse, contains from 2·5 to 3·0 per cent; a specimen of good cocoa-nibs yielded me 2·37 per cent., while in Dika bread I find only 1·51 per cent, or in the picked-out and cleaned kernels 1·53 per cent. of nitrogen. The mean number, 1·52, corresponds to 9·5 parts of vegetable albumen or casein (legumin); and to such matters must be ascribed whatever flesh-forming power Dika bread may possess.

The mineral matter in Dika bread is present to the extent of 4·4 per cent., and is chiefly composed of phosphate of lime, potash, iron, and silica.

Annexed is a tabular form of the above analysis :—

PROXIMATE COMPOSITION OF DIKA BREAD.

	In 100 parts.
Nitrogenous material	9·5
Fat	65·5
Water	5·0
Ash	4·4
Other non-azotized constituents	15·6
	100·0

Since writing the above, I find that Dr. Oudemans, of Utrecht, has examined Dika fat. By saponification he separated myristinic and laurinic acids, the former being the chief constituent.

ON THE MINERAL CONSTITUENTS OF PLANTS.

(First Paper.)

EXAMINATION OF CRYSTALLINE GROWTHS FROM THE SURFACE OF MEDICINAL EXTRACTS.

BY MR. JOHN ATTFIELD, F.C.S., DEMONSTRATOR OF CHEMISTRY AT ST. BARTHOLOMEW'S HOSPITAL.

The study of the chemistry of plants is confessedly one of the most difficult of chemical tasks. And yet it must be one of the most important; for few students of nature appeal to the chemist more frequently than the botanist does. And what amount of information does he obtain? Much certainly if considered absolutely, but very little if compared with that which cannot be arrived at. With regard to the organic proximate principles of plants our knowledge is considerable, is constantly being added to, and with the help of Rochleder's recent admirable monograph on the subject ("On the Proximate Analysis of Plants and Vegetable Substances," *Pharmaceutical Journal*, 1860–61), will, no doubt, be still more rapidly increased. With regard to inorganic or mineral principles, however, our knowledge though large in amount is far from satisfactory, and it is the author's intention, in this and succeeding papers, to attempt to throw light upon the subject.

To insist here upon the equal importance to a plant of its mineral and non-mineral constituents would be superfluous, for such is now universally admitted to be the case. But what I would draw particular attention to and protest against, is, that in nearly all chemical and botanical works the nature and amount of these mineral constituents is assumed to be correctly represented by the ash which is obtained on burning the plant. Of course a scientific chemist knows this to be mere assumption, but a general student cannot be expected to detect the artificial character of the stated result of the analyses of such an ash; hence generalization on the subject is apt to be erroneous and the acquirement of an exact knowledge of nature's laws retarded. Doubtless an examination of the residue left on incinerating a vegetable substance will indicate much; will yield facts which could not be acquired in any other way; will even show, for the chief part, what were the ultimate mineral components of the original body: but the condition in which those ultimate constituents existed in the vegetable, is, excepting in a few instances, the result of certain theoretical considerations of the analyst; considerations which, truly, are based on experimental synthesis, but synthesis not performed under conditions similar to those which obtained in the living plant. For example:—metallic chlorides are generally present in plants, but on burning, a portion of these

will surely volatilize and be lost. Again, considerable experience has shown me that sulphates are more frequently present than absent in vegetable juices, but these, as the chemist well knows, will be reduced to sulphides in the ash, and on digestion with hydrochloric acid in the usual manner, will be mostly converted into chlorides; the sulphur being partly evolved as sulphide of hydrogen, but chiefly deposited in the solid state and ultimately lost as sulphurous acid, but little being reoxidized to sulphuric acid. Nitrates and oxalates also will, under the circumstances alluded to, certainly be converted into carbonates, and consequently be probably overlooked. In reference to nitrates, I may state that nitrate of potash is far more frequently present in plants than is commonly supposed. Out of twelve specimens of those crystalline growths which sometimes appear on the surface of medicinal extracts, I have found four to consist of this salt. In two of these cases, nitrate of potash had not previously been suspected to be present in the plant from which the extract was prepared. I have recently been told by a competent observer that a medicinal preparation containing the soluble parts of a plant was once noticed to give off much nitrous vapour during fermentive frothing, a phenomenon that, no doubt, was due to the presence of nitrate of potash. That the latter salt does so decompose under the circumstances is recorded at page 47 of Vol. XII. of the 'Pharmaceutical Journal,' where a correspondent observes that if nitrate of potash be added to infusion of senna, say one grain to an ounce, and the mixture be placed in well filled and corked bottles and kept under water, nitrous fumes will be evolved on opening the bottle.

If, then, decomposition occurs on heating individual salts in the presence of organic matter, much more will extensive changes take place when such a heterogeneous mixture as the mineral constituents of a plant is exposed to the high temperature necessary to burn off carbon from an ash.

From the above considerations it must, I think, be evident that to arrive at a correct knowledge of the state in which inorganic salts occur in vegetables, other facts must be obtained than those indicated on examining its ash. Now the sources of such information seem to me to be two, namely, microscopical and chemical examination of the saline efflorescences which appear on such vegetable extracts as are made by the pharmaceutist for use in medicine; and, secondly, the production of the salts themselves, in actual crystals, by evaporating an infusion or decoction of the plant after uncrystallizable matter has been separated out from the solution by Professor Graham's new analytical process, termed dialysis. (Proc. Roy. Soc. and 'Pharmaceutical Journal,' Vol. III. 2nd Ser. p. 118.)

And first with regard to efflorescences. By the kindness of several gentlemen I have been supplied with twelve specimens of extracts on which crystals have made their appearance. Portions of some of these extracts are on the table, and exhibit the salts *in situ*, while from ten of them I have picked off the crystals, and have mounted them on slides for the microscope. All the specimens have been received by the Society's Museum for future reference, and the following is detailed information concerning them:—

No. 1. *Extract of Belladonna.*—The crystals are so imbedded in this specimen that its surface merely presents a rough, instead of a smooth outline. They are very small, but under the microscope are made out to be cubes averaging one-fiftieth of an inch square. They communicate a pure violet colour to flame, and give the characteristic silver reaction of chlorine; in fact, they are crystals of chloride of potassium.

No. 2. This efflorescence is also from extract of belladonna. It partly consists of well-defined cubes of chloride of potassium, but besides these there are many six-sided prisms, some definite in outline, others most irregular. If one or two be dissolved in a small drop of water, and the solution be allowed to spon-

taneously evaporate on a microscope slide, many prisms, accompanied by a few rhomboids, are obtained; both forms cause rotation and division of plane polarized rays of light, and thus physically may be said to consist of nitrate of potash. In this instance however the crystals were sufficiently numerous to admit of applying the usual chemical tests for nitric acid, namely, the production of a black colour when their solution was mixed with sulphate of iron and sulphuric acid, and the evolution of red nitrous fumes on heating with metallic copper and sulphuric acid. The strong violet tint given to a colourless flame was sufficient to prove the base to be potassium, and thus altogether the salt was shown to be nitrate of potash.

No. 3. Another small sample of extract of belladonna. I had not sufficient of this to set up as a museum specimen, but the accompanying crystals from it consist partly of square prisms of chloride of potassium, one five-hundredth of an inch in thickness, and one-fiftieth of an inch long; and partly of larger crystals, most irregular in shape, but chemically proved to be nitrate of potash.

No. 4. *Extract of Hemlock.*—This specimen is almost covered with cubes of chloride of potassium, one-sixtieth to one-eightieth of an inch square. They could not be perfectly freed from adhering matter, but their form will readily be made out on magnifying those on the slide to fifty or a hundred diameters.

No. 5. *Compound Extract of Sarsaparilla.*—Few extracts have a greater tendency to yield crystals than that of sarsaparilla. They are well known to be chloride of potassium, and generally occur in slender needles and large cubes simultaneously, one of the latter in the accompanying glass cell is the eighth of an inch square. On another slide will be found some of the slender prisms.

No. 6. *Extract of Henbane.*—Many crystals occur on this specimen. They all are six-sided prisms of nitrate of potash, and vary in size from one one-hundredth to one-thirtieth of an inch in the short diameter, and from one-twentieth to one-eighth of an inch in length.

No. 7. *Extract of Colchicum Seeds.*—This is studded with small tufts of minute acicular crystals of chloride of potassium. There also are a few needles four-thousandths of an inch broad, and four-hundredths long; these, too, microscopically and chemically, are found to be chloride of potassium.

No. 8. *Extract of Stramonium Seeds.*—The surface and whole mass is thickly set with cubes of chloride of potassium, averaging one-tenth of an inch square. The beautiful regularity of form characteristic of the salt is well seen, even by the unaided eye, in this specimen of isolated crystals.

No. 9. Besides chloride of potassium, this second specimen of extract of stramonium seeds is remarkable, as containing much sulphate of soda. In the dry atmosphere which now surrounds the specimen, most of the crystals have assumed the well-known white pulverulent appearance due to escape of water of crystallization. When freshly taken from the extract they were transparent, but without definite form. Their components were however easily recognized by the appropriate chemical reagents. The singularity and quantity of this efflorescence induced me to make a quantitative determination of the combined sulphuric acid in the extract, and the numbers obtained corresponded to 15·8 per cent. of the ten-atom hydrate of sulphate of soda (NaO,SO_3+10 Aq.). I am inclined to think however that some of this acid is combined with potash, and some probably with lime, for on examining some fresh stramonium seeds, the soda found did not seem sufficient to neutralize the large quantity of sulphuric acid present. In fact, sulphate of potash was subsequently found in the aqueous extract of these seeds.

No. 10. *Extract of Aconite.*—The surface of this specimen has thin brown patches, one-sixteenth of an inch in diameter, scattered over its surface. Each

patch, as seen when magnified one hundred times, is composed of numbers of exceedingly minute crystals; analysis shows that they consist of chloride of potassium.

No. 11. *Extract of Lettuce.*—This efflorescence consists of six-sided prisms of nitrate of potash, of which some are so small as to be only one three-hundredth of an inch in breadth, others one-fiftieth of an inch in diameter. Nitrate of potash has already been observed in the juice of lettuce, so that it might be expected to occur as an efflorescence on the extract.

No. 12. Another specimen of extract of sarsaparilla, exhibiting crystals of chloride of potassium.

Nos. 13 and 14. *Saline Efflorescences on Medicinal Preparations containing Soap.*—Although these specimens of pill-masses do not illustrate the subject of the mineral constituents of plants, they nevertheless so much resemble vegetable extracts, that the pharmaceutist will probably be glad to know something concerning them. If common hard soap has been used in their manufacture, the crystalline outgrowth will be carbonate of soda in slender rhomboidal prisms; the same salt, in fact, that is often met with on toilet and kitchen soaps. If soft soap has been employed, the crystals may be chloride of potassium. Marbled Castile soap, however, nearly always yields up its sulphate of soda as an efflorescence on pill-masses prepared with that variety; the source of the salt being the double decomposition of the stearate of soda, and the sulphate of iron used in marbling. The accompanying specimens of soap and opium and compound squill pill exhibit crystals of sulphate of soda on their surfaces. Both the carbonate and sulphate of soda rapidly lose water of crystallization in a dry atmosphere; so that when examined microscopically a drop or two of water must be placed on the slide, and then the crystals will remain transparent and sharp in outline sufficiently long for observation.

So far the actual results of this investigation may thus be summed up. First: seven out of twelve specimens of medicinal extracts, or concentrated juices of plants, have been proved, by analysis of the salts which form in and grow out of them, to contain chloride of potassium, a salt which we already knew to exist in some of them, and which we might expect to be present in most vegetables, but which, if we judge from published analyses, has been overlooked in some plants whose ashes only have been examined. Second: four of the twelve have yielded crystalline growths of nitrate of potash, a salt that hitherto has been considered as only occasionally occurring in plants, but which evidently is frequently present. And third: one extract has, most unexpectedly, yielded an efflorescence of sulphate of soda; further experiments indicating, though not conclusively proving, that it and sulphate of potash may replace each other in the physiological functions exercised by such salts. These results are, I think, not only interesting but important. Important in themselves, as additions to the common stock of pharmaceutical knowledge, and important in their bearing on the chemistry and physiology of plants. I intend them however to be only provisional, and am unable to make any extended generalizations till an examination has been made of five or six efflorescences from each extract used in medicine. To this end I must have the aid of those engaged in pharmaceutical operations; and I trust that members of the Society and other gentlemen, who may be present at this meeting, or who shall hereafter read this paper, will kindly send to me any small specimens of efflorescing extracts that may now, or at a future time, be in their possession. I am also anxious to obtain one-ounce or two-ounce samples of medicinal extracts whose origin and history are well known: for the result of an analysis of their mineral constituents would be of increased value if one could know what amount of raw material was used in their manufacture, the date of their preparation, whether common or distilled water was used in infusing

the plant, and other like information. Some extracts, as is well known, have a tendency to deliquesce, a few to crumble, while other states are occasionally met with equally undesirable for dispensing purposes, and which might possibly be avoided by precautions suggested by a fuller examination of them.

Up to within the last few months the difficulty of separating the crystalline constituents of plants from the mass of uncrystallizable matter contained in the juice, was so great that very few of the salts could be obtained in an unaltered state. But since the researches of Graham on liquid diffusion, we are in possession of a method that permits of such a separation being effected, and this is the second process that I propose to adopt for obtaining inorganic saline compounds from definite extracts of vegetables. All that seems to be necessary is to place the extract, rendered liquid by water, on one side of such a membrane as De la Rue's paper parchment, and to have pure water on the other side. The parchment may be securely tied over one end of an open glass or gutta-percha cylinder, the liquid extract introduced, and the whole floated, or in any other manner partly immersed, in a vessel of water. After a time the crystalline portion of the substance will have diffused out to the pure water, and the solution may then be evaporated and tested in a manner quite inadmissible when so much uncrystallizable matter was present. The mere act of evaporation probably causes but little alteration in the constitution of salts contained in such a solution; at all events, many saline compounds, that otherwise might be overlooked, will, by the above mode of operating, be found to be present in plants. Some salts are probably present in quantities too small to enable them to effloresce from extracts, or else perhaps have no tendency to effloresce, and yet are of such a nature as to elude detection in the ash; in these cases dialysis would expose them.

In illustration of this application of dialysis, I will give the results of an examination of the diffusate from five hundred grains of a specimen of extract of henbane in comparison with an analysis of the ash obtained on burning a similar quantity taken from the same specimen. The extract, dissolved in one pint of distilled water, was poured into the dialyser, and floated on five pints of distilled water for twenty-four hours. Four pints of the diffusate (four-fifths of the whole) were evaporated to dryness, and the residue heated in a water-oven until it ceased to lose weight. In this way extract of henbane was found to contain 27·6 per cent. of crystalline matter; or allowing for a little non-crystalline or "colloidal" (*i.e.* gelatine-like) matter, as Graham terms it, we may fairly consider that the salts make up one-fourth of the extract. Subsequent experiments showed that nearly the half of this saline matter, or about 11·0 per cent. of the extract, was nitrate of potash. The second portion of extract yielded on burning only 16·2 per cent. of saline constituents; it was powerfully alkaline, did not contain a trace of nitrate of potash, and was of course chiefly carbonate of potash, the exact amount of the latter being 7·9 per cent. of the extract. Under ordinary circumstances the source of this carbonate of potash would probably have been set down as potash salts of organic acids, but by the aid of dialysis the conclusion is obvious that nitrate of potash and organic matter furnished it all, or nearly all. Already my experiments indicate that nitrate of potash is frequently present in plant juices, and I have no doubt that much of the base of commercial pearlash originally existed as nitrate of potash in the plants whence the ash was derived. In a future paper I trust I shall be able to prove the correctness of this supposition. An estimation of the chlorine in the saline residue of the diffusate showed that the extract contained 5·0 per cent. of chloride of potassium, while a similar determination in a portion of the ash yielded chlorine equal only to 2·12 per cent., thus again proving the value of Graham's beautiful process. From the ash a higher percentage of sulphuric acid was obtained

than from the diffusate. This I believe to be owing to the fact that it exists as sulphate of lime, and from the low crystallizing power of this body we might expect it to have a small diffusion-value; longer dialysation would probably give a larger centesimal proportion than that found, viz. ·88 of the extract against 1·4 by incineration. For isolating some of the mineral matters of plants, such as phosphate of lime and phosphate of magnesia, dialysis would be of little use; fortunately however these salts are but little altered by the process of obtaining the ash.

In examining the growths on extracts, I have of course met with many specimens of common vegetable mould, and in three instances have discovered thriving colonies of little animals. The latter will be treated of in a separate communication. I beg to thank those pharmaceutists who forwarded the extracts to me, and also those gentlemen who would have done so had they been able to procure any. I forbear mentioning the names of these gentlemen, as some seemed to think the possession of such samples discreditable. For the guidance of those who will be good enough to look through their stock of extracts, I may mention that crystals are most frequently met with in the months of May and June, when the preparations will probably be nearly a year old, and that still more fertile sources are portions of extracts that have been set aside as samples, or that, having fallen into disfavour as remedial agents, have been undisturbed for several months.

Mr. Deane thought the paper which had just been read opened an important subject for investigation. Some of the results already obtained by the author were interesting: and no doubt, by pursuing the same course of investigation, much new light would be thrown upon the nature of the saline constituents of vegetable juices. He had himself commenced some experiments with a similar object some time ago, but had not been able to pursue them. He hoped the author of the paper would continue his experiments, and he (Mr. Deane) would be happy to supply him with any specimens he may have that were suitable for examination.

Dr. Redwood thought the author of the paper had been wise in not attempting to generalize much upon the results he had yet obtained. The inquiry was calculated to add to our knowledge on the subject; but at the same time the efflorescence found upon vegetable extracts could not be considered correctly to represent the salts originally present in the juices of the plants from which the extracts were made. The examination of these efflorescences would give a nearer approximation to the state in which the mineral constituents existed in the living plant than could be obtained by burning and examining the ash; but it was well known that in evaporating saline solutions material changes take place in the constitution of the salts present, and this would occur in the preparation of the extracts and the subsequent efflorescence of the salts. Then with regard to the nitrates found among the effloresced salts, which Mr. Attfield seemed to think are more abundant in plants than has hitherto been indicated, and which he thinks are probably the source from which the carbonate found in the ash is partly derived, he (Dr. R.) would suggest that the nitrates found in vegetable extracts may to a great extent be the result of the oxidation of organic matter, and may not have pre-existed in the juice of the living plant. In the examination of waters it was customary to ascribe nitrates when present to such cause, and why should they not be equally produced in vegetable extracts? There was one point in connexion with the subject of the paper which appeared remarkable; it was that among the salts which crystallize out of extracts, the most frequently occurring was chloride of potassium. This in fact was the salt

generally found, while sulphate of potash was never, that he was aware of, found. Yet in the ashes of plants sulphate of potash was a constant ingredient, and this salt, if present, ought to crystallize out more readily than the chloride, on account of its sparing solubility. He should be glad to hear how Mr. Attfield accounted for this.

Mr. Attfield was much obliged to the last speaker for his suggestions. With reference to the nitrates he did not think the circumstances in the case of extracts were analogous to those of a water containing organic matter. In the latter case a comparatively small quantity of organic matter was exposed to the action of much oxygen dissolved in the water. This was not so in extracts. With reference to sulphate of potash, he thought this salt, as found in the ashes of plants, was chiefly derived from double decomposition between sulphate of lime and carbonate of potash.

The Chairman suggested that experiments by dialysis on the preserved juices of plants would probably give the mineral constituents of plants in an unaltered condition.

Mr. Hills thought the soil in which the plants grew would modify the salts present in their juices. Experiments should be made on similar plants grown in different soils.

Mr. Wood inquired of Mr. Attfield whether he had found salts of ammonia in vegetable extracts?

Mr. Attfield said he had not found ammonia, but he had not specially looked for it.

Mr. Whipple had frequently found ammonia in vegetable extracts; in fact, in all those which contained much nitrogenous matter. He thought the chloride found in extract of sarsaparilla was partly derived from sea water, to which the root was often exposed in its conveyance to this country.

POISONS NOT ALWAYS POISONS.

BY MR. JOHN ATTFIELD, F.C.S., DEMONSTRATOR OF CHEMISTRY AT ST. BARTHOLOMEW'S HOSPITAL.

In the course of a microscopical examination of the saline efflorescences which often appear on the surface of medicinal extracts—juices of plants concentrated to a semi-solid condition—I met with several colonies of little animals. This was somewhat remarkable, as very small quantities of such preparations produce powerful abnormal effects on animals generally. Numbers of these little creatures were, for instance, living on extract of colocynth, a nauseous purgative; others on extract of taraxacum (dandelion); while the third were found thriving on an extract whose active principle, strychnine, is one of the most violent of poisons to man and to familiar quadrupeds, the extract of nux vomica.

From their general resemblance to the creepers frequently seen on cheese, it was evident that these minute beings belonged to the family of mites, or *acari*, a division of the *arachnida*, or spider and scorpion class, a class whose members differ from those of the class Insects, in having eight legs instead of six. From several prominent peculiarities, however, it was evident that they were not common mites, and, in fact, they ultimately proved to be members of three distinct and new species.

There are already a few cases on record, of mites and insects having been found living on irritating vegetable substances. Ginger, for instance, is peculiarly liable to their attacks. But it has been considered that in these cases the starchy and soft fibrous matter only has been eaten, the active

principle being rejected. Now remembering that all extracts have once been liquid, their perfect homogeneousness precludes the idea than an animal could select any particular constituent. On the contrary, the conclusion is irresistible, that in taking a mouthful it must be devouring a portion of every constituent; and that in eating nux vomica, therefore, an acarus must be eating strychnine. But—as ingeniously suggested by a physiological friend—though the poison be eaten it may not be assimilated, but pass through the intestinal canal unchanged. To decide this point I examined a few hundreds of acarine excrement from nux vomica; about as much as would lie on a threepenny piece. The collection of this substance was easy, for, like the cheese-mites, the nux-vomica acari have rapid digestive and excretive faculties. Moreover the extract is heavier than the excrement, so that on placing a quantity of the disintegrated material on water the former sinks while the latter floats and may be skimmed off. Only a trace of strychnine however was found in the excrement; a quantity that, considering the facility with which this alkaloid can be separated from other organic matter, was exceedingly minute; a quantity that, doubtless, was dissolved from the extract by the water in the separating process, and remained adhering to the floating excrement.

But to incontestably prove that mites live and thrive upon food that is to man a deadly poison, I secured some lively, growing specimens from the nux-vomica extract, and after searching them with a high magnifying power, in order to be certain that no extract was accidentally adhering to their bodies, confined them singly in glass microscope cells, giving to several pure strychnine. In less than two days the foodless ones were all dead, killed, doubtless, by starvation; while those supplied with strychnine were as lively as ever. Three weeks after mounting they were as well as at first, and specimens were exhibited to the members of the Chemical Discussion Association of the Pharmaceutical Society. Some have lived on for two months and are apparently still healthy and increased in size.

Moreover, the acari from the extracts of taraxacum and colocynth have lived on strychnine equally well with those from nux vomica; and, to show their indifference to the quality of food presented to them, will partake of strychnine, morphine, or cheese, with equal avidity.

Poison-mites having a relish for cheese, I thought that cheese-mites ought not to object to poison, and so, having obtained some from a cheesemonger, treated them to powdered strychnine. But they all died; the change in diet was too sudden. Obviously they should have been placed on a mixed diet first, for in another experiment a number greedily ate up some cheese, with which twenty per cent. of strychnine had been thoroughly incorporated.

The fact, then, that substances which are intensely poisonous to the higher animals do not affect acari, is thus substantiated. This is more especially astonishing in reference to strychnine, which is of all poisons one of the most energetic, its frightful effects on the nervous and muscular systems being but too well known. Again, strychnine is a very stable body, standing almost alone among organic principles in its power of resisting the carbonizing action of concentrated and hot sulphuric acid. And yet, setting aside its tetanic influence, its assimilation as food is not altogether inconceivable, for, as is well known, it is very susceptible of oxidation, and if eaten by an animal whose nervous system differs from that of most other animals, it would, after solution and circulation, be readily oxidized in the blood, and its chief elements removed by the lungs.

With regard to the action of poisons generally, the above facts would seem to be but one extreme of a chain of evidence, many links of which, it is true, are still wanting, but which appears to indicate that a so-called poison is only a a poison when the animal taking it is unaccustomed to it, or when the amount swallowed is far larger than that usually taken in the system. Thus in all

parts of the world men are to be found who gradually habituate themselves to eat arsenic, opium, tobacco, etc., until their daily dose is sufficient to kill from two to ten of their own species. Sheep have been known to gradually consume unwholesome plants to such an extent as to render their flesh capable of producing serious effects upon those partaking of it. Hedgehogs will, I am told by a high authority, eat almost anything; and the common toad cares little for hydrocyanic acid or the ordinary mineral poisons. In these and many other instances that might be mentioned, a very large amount of the particular poison would have to be taken before the usual effect ascribed to it could be produced. Ultimately we come down to acari, a class that may be brought to subsist entirely upon a so-called poison: for here strychnine is only a poison in the same sense that starch would be a poison to man, namely, in that it does not contain every element necessary for the reproduction of tissue.

But the physiologist can better generalize on this subject, and will, I am sure, find it a field of research yielding rich fruit; for, in the words of Professor Busk, F.R.S., "The facts concerning these acari would seem to point out the interest that would attend experiments in the same direction on other articulate animals, and suggest that they might all be found equally proof against poisons which act powerfully on the nervous system of higher animals."

Fig. 1.

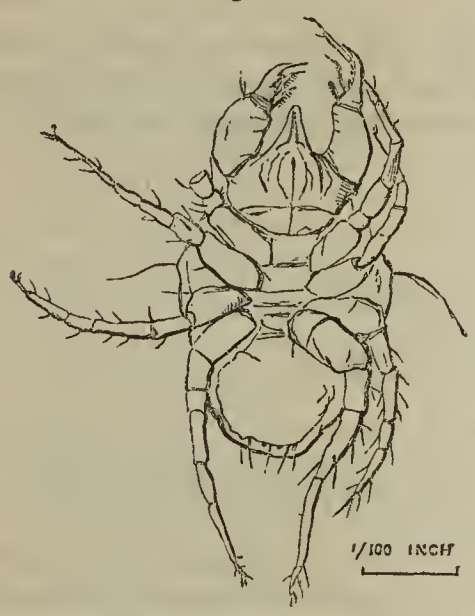


Fig. 2.

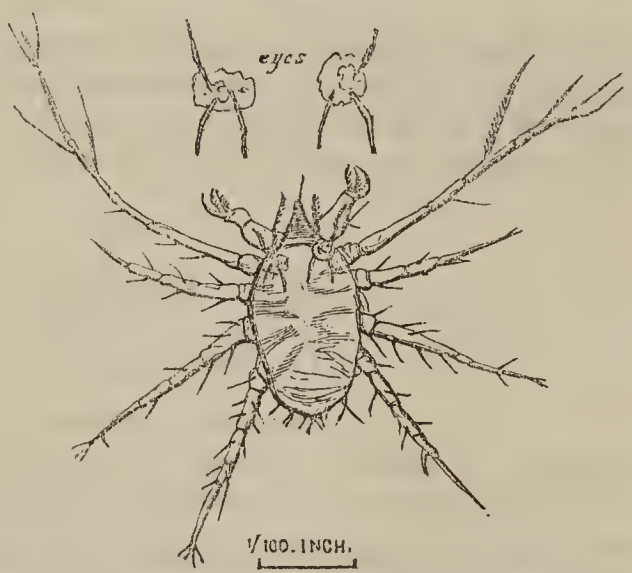
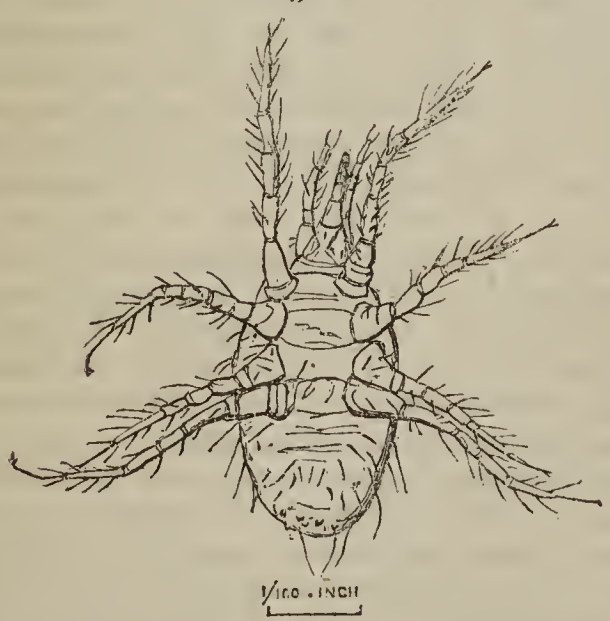


Fig. 3.



At the Pharmaceutical Meeting in December, living specimens of the three new acari were exhibited. For the present occasion (Pharmaceutical Meeting, February 7) a number of the cheese-mites living on cheese and strychnine have been mounted. To give a general idea of their forms, and facilitate future recognition of the acari, Professor Busk has made drawings of them, of which the accompanying engravings are copies. (Greatly enlarged drawings were also exhibited at the Meeting.)

Fig. 1 is a ventral aspect of the acarus, from extract of taraxacum.

Fig. 2 is a dorsal view of that from compound extract of colocynth. It has "two curious eyes, each having three strong spikes; the surface of the limbs is finely wrinkled; the hairs are all rough or serrated." An enlarged view of these remarkable eyes is given with this figure.

Fig. 3 represents the acarus from extract of nux vomica; ventral aspect.

Mr. Busk says that "the acari from colocynth and taraxacum are probably of the same genus, but different species, while that from nux vomica is generically different."

In conclusion, may I ask Pharmaceutists who have miscroscopes, to examine any mould they may find on old extracts, and if they discover mites, to forward specimens to me, as a well-known entomologist has expressed a desire to more minutely examine such animals?

Mr. Deane related several instances which had come under his notice, showing what little influence some poisonous substances exerted upon the lower class of animals. He referred in particular to toads and frogs as being indifferent to the action of prussic acid.

NEW AMERICAN REMEDIES.

I.—PODOPHYLLUM PELTATUM.

BY ROBERT BENTLEY, F.L.S., M.R.C.S. ENG.,

PROFESSOR OF MATERIA MEDICA AND BOTANY TO THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN; PROFESSOR OF BOTANY IN KING'S COLLEGE, LONDON.

The recent introduction into the medical practice of this country of some new remedies from North America, renders it highly necessary that a full notice of their sources, general and chemical characteristics, medicinal properties, uses, preparations, and doses of the more important of them, should be brought before the notice of the Pharmaceutical Society, and published in the Journal. The necessity for such reports is also more desirable, from the fact of such remedies being in the majority of instances but briefly treated of even in the standard American works on Materia Medica, Therapeutics, and Pharmacy, which are in common use in this country; and hence a knowledge of them can only be obtained by those who have access to the less known American periodicals which are devoted to the consideration of such subjects. Even then the amount of knowledge acquired will be frequently very limited, as such remedies are generally but superficially described by American writers. It happens most fortunately at this period, through the liberality and kindness of Professor Procter, and the Messrs. Hodgsons of Philadelphia, that we have a good collection of American drugs in our museum. We have therefore materials at hand for a more complete description than has hitherto been attempted, of these new remedies. I propose accordingly to write a series of papers upon them, which will appear from time to time in the 'Pharmaceutical Journal,' till the subject is exhausted. They will be treated of in the order of their natural arrangement; those

which appear to be most worthy of notice being examined in detail, at least so far as they have any particular interest to the pharmaceutist, while those of minor importance will be but briefly alluded to.

These new remedies are commonly styled Eclectic medicines, from their constant use by a class of irregular American medical practitioners called Eclectics, who are principally characterized by eschewing altogether in their practice the use of mercurials, antimonials, and arsenicals, and by depending essentially upon vegetable remedies.* Many of them, however, are incorrectly so named, as they were known and used in America long before the class of Eclectics was heard of. At the same time we must admit that much credit is due to the Eclectic practitioners for their observations upon, and their investigations into, the medicinal properties of the indigenous plants of North America, as in many cases they have in this way been the first to direct the attention of the regular medical practitioners to important vegetable remedies.

Our acquaintance with the action of medicines upon the system is at present so exceedingly limited, that we are principally dependent for our knowledge of the value of remedies in particular diseases, upon the experience alone of those who have administered them. Many of the remedies we now propose to describe, and in some cases to introduce to the notice of the medical practitioners in this country, have long had a considerable reputation founded upon experience of their use in North America, and are therefore worthy of at least a trial in this country, with the object of confirming or otherwise by their use here, their reputed medicinal properties. It has been by proceeding in this manner in past times, that is, by the accumulated experiences of successive practitioners in different countries and periods, that we have arrived at the knowledge of the uses in disease of all our most important remedies; and it will be only by following, in the present state of our knowledge of therapeutics, in such steps, that we can hope to attain useful results in future. We shall thus soon ascertain the real value of reputed new remedies; and render ourselves independent of mere fashion, or the recommendations of any particular individuals or schools, however eminent, by whom they may have been introduced.

We shall commence our notice of these new remedies with those derived from the Natural Order Ranunculaceæ, of which there are five, namely, *Cimicifuga (Actæa) racemosa*, *Coptis trifolia*, *Podophyllum peltatum*, *Hydrastis canadensis*, and *Xanthorrhiza apiifolia*. As the *Cimicifuga racemosa* has already been fully described by me,† and as sufficiently explicit notices of *Coptis trifolia* may be found in standard American‡ and English§ works on Materia Medica, it will be only necessary in the present reports to refer to *Podophyllum peltatum*, *Hydrastis canadensis*, and *Xanthorrhiza apiifolia*. The *Podophyllum peltatum* will be alluded to in the first place, and will be more fully examined than the other two, as it undoubtedly possesses valuable medicinal properties, and must be accordingly regarded as an important addition to our Materia Medica.

1. Podophyllum peltatum, Linn. May-Apple.

History.—The early history of this medicinal agent is very obscure; it would appear to have been in use for ages by the native Indians of North

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* See an interesting paper *On Eclectic Pharmacy* in the present volume of the 'Pharmaceutical Journal,' page 320, by S. W. Cleave, for a notice of these practitioners.

† 'Pharmaceutical Journal,' 2nd Ser., Vol. II. p. 460.

‡ Wood and Bache's 'United States' Dispensatory,' 11th edit. p. 302; and Wood's 'Therapeutics and Pharmacology,' vol. i. p. 226.

§ Pereira's Mat. Med. and Therapeutics, 4th edit. vol. ii. part 2, p. 698.

America, from whom a knowledge of its medicinal properties was acquired by the earliest colonists of the country, and by them transmitted in course of time to the medical practitioners. It must have been in some considerable repute as a remedial agent for a long period; since in 1820, the date at which the first United States Pharmacopœia was issued, it was placed in the primary list of the Materia Medica, and a formula was ordered for the preparation of an extract. Since that period it has maintained its position in the several issues of the United States Pharmacopœias, and latterly it has come into far more extensive demand, owing, it would seem, in a great measure, to the discovery of its active cathartic resinoid principle.

Synonyms.—This plant is the *Podophyllum peltatum*, Linn.; of Willd., *Spec. Plant.* ii. 1141; Barton's *Med. Bot.* vol. ii. 9; and Carson's *Illustrations of Med. Bot.* i. 18, pl. 11. It is the *Anapodophyllum peltatum*, Mœnch. In common language it has been termed *May-Apple*, *Hog-Apple*, *Raccoon Berry*, *Wild Lemon*, and *Mandrake*. The name of May-Apple is that by which it is more generally known, and which it is desirable it should in common language retain, to prevent its being confounded with other popular remedies or economic substances derived from different sources, and to which ts other common names have been also applied.

It derives its generic name from πους, a foot, and φυλλον, a leaf, in consequence of the stem bearing at its apex two long, round, firm petioles, each of which is inserted in a peltate manner to its corresponding blade. From this mode of insertion, the specific name of *peltatum* is derived. The common names of May-Apple, Hog-Apple, Raccoon Berry, and Wild Lemon, have been derived from the time of the first appearance of the flowers, or from the colour, shape, taste, and other peculiarities of the fruit. The origin of the term Mandrake is by no means clear. It is commonly supposed to have been derived from the true Mandrake (*Mandragora officinalis*), a plant of the Natural Order Solanaceæ, or the Atropaceæ of Miers, as its leaves, etc., when green, possess narcotic and poisonous properties, like it.

Botany.—*Podophyllum peltatum* belongs to the Natural Order Ranunculaceæ of Jussieu and most other botanists. By De Candolle it was ultimately placed in an Order of which this genus was taken as the type, and which he accordingly termed Podophyllaceæ; and by Martius it is put in Podophylleæ. It is now more commonly referred to the Ranunculaceæ, in which Order we have arranged it here.

Generic Character.—Sepals 3. *Petals* 6–9. *Stamens* 12–20. *Stigma* large, sessile. *Fruit* somewhat fleshy, indehiscent, surmounted by the persistent peltate stigma.

Specific Character.—Rhizome perennial, creeping, usually some feet in length; enlarged at intervals into irregular more or less rounded tuberosities, from which several rootlets or radicles arise below. *Aerial stem* erect, herbaceous, springing from the upper surface of the tuberosities, round, smooth, from 8–12 inches high, and bearing at its summit two dichotomously arranged leaves, which are placed on petioles from 2–4 inches long—and a solitary flower in the fork thus produced. The *leaves* are peltate, with from 5–7 wedge-shaped, oblong lobes, which are usually two-toothed or bifid at their extremities, and smooth on their upper surfaces, but slightly pubescent on the lower. The *flower* is solitary, white, and attached to a round nodding peduncle. The *fruit* is large, about the size of an egg, nearly oval, and crowned by the persistent peltate stigma; when ripe, it is of yellowish colour externally, 1-celled, and contains about 12 seeds, which are imbedded in a sub-acid, sweetish, fleshy pulp.

Habitat.—The plant is commonly found in the botanic and other gardens in this and some other countries of Europe, but it is only found wild in the States of America. There it is widely spread, extending from New England

to Georgia, and growing in low moist shady woods, or in low newly-cleared ground, and generally in marshy situations. It flowers about the end of May or beginning of June, and ripens its fruit about September.

Properties.—The plant generally when fresh has a narcotic odour. This is especially evident in the leaves; which are then reputed poisonous. This poisonous property is however lost when the plant is dried, and hence it must be due to the presence of some volatile principle, which is then dissipated. The fruit is edible, but if eaten in large quantities laxative. It is not generally much esteemed. The rhizome and rootlets (in common language the root) possess active cathartic properties, and are the only portions used in medicine. The rhizome with its rootlets, as already noticed, is officinal in the United States Pharmacopœia.

Collection and Commerce.—The rhizome is considered most active when obtained after the leaves have fallen; this is commonly the case about August, at which period it is therefore usually collected, and prepared by drying, etc., for medicinal use. At present it has not been imported to any great extent into this country, but its active resinoid principle (*podophyllin*) is brought over in large quantities. Some of our manufacturers have given up making podophyllin, believing that they could obtain it cheaper from America. We know, however, at least one chemist who still prepares it largely. We shall allude to the characters of podophyllin presently; but we must in the first place describe the general characteristics of the rhizome and rootlets from which it is obtained.

General Characteristics.—Podophyllum root, as it is commonly called, is in reality a rhizome, from which the true rootlets arise below, and the aerial stems above. In the dried specimens (to which our future remarks will exclusively apply) these rootlets are sometimes absent altogether, but more commonly they are present in varying proportions, in which case they are either separated from, and mixed in a loose state with the rhizomes, or firmly attached to them at the tuberosities.

The *rhizome*, as imported, is either simple or branched. In length it varies from about an inch to six or eight inches, or even more; more commonly it is from two to five inches. It is from two to four lines thick, averaging about that of a common goose-quill. At intervals of from two to four inches the rhizome presents large, irregular, more or less flattened tuberosities, from the lower surface of which the rootlets arise, or, when they are detached, their position is marked by whitish, more or less projecting scars. From the upper surface of the tuberosities the aerial stem proceeds, a portion of which sometimes remains attached, but more frequently it is absent and its place marked by a large roundish scar, below which may be noticed several annular ridges, which are the scars left by fallen leaves. In form the rhizome presents a rounded or more or less flattened appearance. The rounded portions, which are evidently the older, are firm in texture, reddish or blackish-brown in colour externally, interspersed with lighter coloured markings, and nearly smooth. The flattened portions are more or less spongy in texture, lighter coloured, being of a reddish yellow-brown, and much wrinkled longitudinally, evidently in consequence of their contraction during drying. When portions of the stem remain attached, these are of a very spongy texture, much wrinkled externally, and of a reddish-yellow colour. The rhizome breaks short, smooth, and close, without the slightest projecting fibrous appearance upon the exposed surfaces. A transverse section presents a large central medulla or pith of a whitish colour; this is surrounded by a dark somewhat resinous-looking concentric line, on the outside of which is a large firm cortical portion of a yellowish-white colour internally, and of a reddish-brown or yellowish colour on its external surface.

The *rootlets* vary in length, in some cases being two or more inches; and

in size averaging about that of a common knitting-needle. Externally they present a nearly smooth appearance, and are lighter-coloured than the rhizomes, being yellowish-red rather than reddish or blackish brown, as is the case with them. Their fracture is short and smooth; a transverse section exhibits a small central woody mass (meditullium), surrounded by a large whitish cortical portion, the external layer of which is firmly adherent to the internal layers. Both the rootlets and rhizome are easily reduced to powder, which is of a yellowish-grey colour, not very unlike that of jalap.

The taste of both the rhizome and rootlets is at first somewhat sweetish, but afterwards by chewing, it is nauseous, slightly acrid, narcotic, and bitter. The taste of the rhizome appears to be most marked. The odour is somewhat narcotic, in some specimens very strongly so, more especially when moistened with warm water. Generally I should regard the rhizome as the most active portion.

Composition and Chemical Characteristics.—Podophyllum has been frequently examined. Dr. E. Staples found its constituents to be *resin*, *starch*, and a *peculiar vegetable substance* crystallizable in white silky tufts.* Mr. Wm. Hodgson, jun., of Philadelphia, obtained a peculiar principle from the rhizome, by first boiling it in water with quicklime, then straining the decoction thus formed, and precipitating the lime with sulphate of zinc. The clear solution was then evaporated to the consistence of an extract; which was then treated with cold alcohol, sp. gr. 0·817, and the alcoholic solution thus obtained was afterwards filtered and evaporated. Lastly, the residue from the above was treated with boiling distilled water, which upon cooling deposited the peculiar principle.† This substance presents the following characters:—"When dry it is in pale-brown scales of considerable lustre; is easily pulverized, is unalterable in the air, and has a strong bitter taste. It is copiously soluble in strong alcohol, and much more so in boiling than in cold water, the aqueous solution retaining when cold about a grain to the ounce. It is soluble to some extent in sulphuric ether. It is readily separated from water by muriatic acid, is coloured red by nitric acid, and becomes first olive or green, and subsequently purple by sulphuric acid. Exposed to heat it fuses, blackens, and is dissipated in black smoke.‡ This principle was at first supposed to be the active cathartic principle of podophyllum, and received the name of podophyllin, but upon trial by medical practitioners it was not found to possess any evident purgative properties.

Podophyllum was afterwards analysed by Mr. John R. Lewis, who found its constituents to be *albumen*, *gum*, *starch*, *extractive*, *lignin*, *gallic acid*, *fixed oil*, *traces of volatile oil*, *salts of potassa and lime*, and *two resinous principles*, one soluble in alcohol and ether, and the other soluble in alcohol only. Both of these resins were found to possess purgative properties.§ It would appear however, from the experiments and observations of Mr. Harvey Allen,‖ that the resin, which is soluble in ether, and which constitutes about four-fifths of the whole resinous matters, is that which alone possesses any active purgative properties. To the resinous matters thus ob-

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* Pereira, 'Materia Medica and Therapeutics,' 3rd Amer. edit. by Dr. Carson; also 4th English edit. vol. ii., part 2, p. 702; and Tegno and Durando, *Translation of Edwards and Vavasseur's Manual.*

† Wood and Bache's *United States Dispensatory*, 11th edit., p. 606; and *Journ. of the Phil. Col. of Pharm.* vol. iii., p. 273.

‡ *Journ. of the Phil. Col. of Pharm.*, vol. iii., p. 275; and Pereira's *Materia Medica and Therapeutics*, 4th edit., vol. ii., part 2, p. 702.

§ Amer. Journ. Pharm. vol. xix. p. 165; and 'United States Dispensatory,' by Wood and Bache, 11th edit. p. 606.

‖ Amer. Journ. Pharm. vol. xxxi. p. 207.

tained, and to which, as we have just seen, the root owes its purgative properties, the name of *podophyllin* or *podophylline*, is now more correctly applied. Podophyllin, as met with in commerce, may be prepared as follows:—An alcoholic tincture is made by percolation, and the spirit afterwards distilled off till the residual fluid is about the consistence of treacle. The residue is then slightly heated, and poured gradually into water kept during the period in a state of agitation. The mixture is then put by for twenty-four hours, when it will be found to have deposited a yellowish or brownish-white precipitate. This is then placed upon a calico filter, and repeatedly washed with water, and then dried on paper at a very low temperature. According to Parrish, the yield of podophyllin as thus prepared is about three and three-quarters per cent.* The podophyllin thus obtained is by no means pure. It is a powder varying in colour from a dark brown to a yellowish or greenish tint. It is insoluble in both hot and cold water, but almost entirely soluble in alcohol. It has a pungent, acrid, disagreeable taste, but no particular odour. According to Procter,† podophyllin may be obtained in a pure state from this commercial substance, by the action of ether and animal charcoal. When pure it is of a white colour,‡ and perfectly soluble in alcohol. It is sometimes adulterated with the powdered root, sugar of milk, and other substances. Such adulterations may be detected by digestion in absolute alcohol, which dissolves the podophyllin, and leaves the insoluble impurities. It should be noticed however that, as just mentioned, commercial podophyllin is never entirely soluble in alcohol. Podophyllin should not be regarded therefore as adulterated, unless there is a sensible proportion left undissolved, when it is digested in alcohol. From the above characters of podophyllum it will be observed that water will take up the bitter principle, and thus acquire a bitter taste, but the resinous matters are insoluble in it. Alcohol extracts both the bitter principle and resinous matters, and hence contains all its virtues, and is consequently by far the best menstruum.

An infusion of podophyllum, made by macerating one ounce of the mixed rhizome and rootlets as usually found in commerce, in twenty-four ounces of boiling water, for twenty-four hours, produced a mixture of a light yellow colour, with a slight tinge of red. It had a peculiarly and well-marked narcotic odour, a bitter, nauseous, opiate taste, and presented the following reactions:—By *Tincture of Litmus* it was evidently reddened; *Solution of Diacetate of Lead* produced an abundant yellowish precipitate; *Tincture of Iodine* a deep violet colour; *Solutions of the Perchloride* and *Persulphate of Iron*, an inky-black colour; *Solution of Sulphate of Copper* at first lessened the colour and caused a slight turbidity, and ultimately produced a dirty-brown precipitate; *Solution of Chloride of Barium* caused a dirty-white precipitate; *Infusion of Galls* an evident precipitate; *Solution of Tartar Emetic* a slight precipitate; and a *Solution of Gelatine* a plentiful curdy precipitate. No very evident effects were produced by *sulphuric*, *nitric*, or *hydrochloric* acids; nor by *solution of Ammonia*.

The effects produced by the application of the concentrated acids, particularly of that of sulphuric acid, to a clean section of the rhizome, were most marked. In the case of nitric acid the whole surface assumed a reddish-brown appearance; in that of hydrochloric acid a faint yellow, which was most marked in the central medullary portion; and in that of sulphuric acid the whole surface became yellow, and the medullary portion bright yellow. The

* Parrish's 'Practical Pharmacy,' ed. 2, p. 191, and Draper in 'Dublin Medical Press.'
† Pharm. Journ. vol. xvi. p. 269.
‡ Dr. Smith, in Amer. Journ. Pharm. vol. xxiv. p. 306.

above actions will be found important guides to the prescribers of podophyllum, and greatly assist in cases of difficulty or doubt in distinguishing it from other substances with which it may be accidentally or fraudulently mixed; or which may be substituted for it. I consider it very important to make this remark, as should a large demand arise, which is extremely probable, every one will have it in his power to ascertain the genuineness or otherwise of the substance supplied to him. It has happened frequently when new remedies have been introduced to the notice of the medical profession, that the proper substance has not been supplied, and hence the remedy has fallen into disrepute. I know that such was the case with respect to *Cimicifuga racemosa* in several instances, and the same is also the case at present with the Guaco, lately recommended as a remedy in gout.

Medicinal Properties and Uses.—With regard to the medicinal properties and uses of podophyllum I shall be brief, as they do not fall especially within the province of the pharmaceutist. We may safely and advisedly leave these matters to our able contemporary the 'Lancet,' the proprietors of which, we are glad to find, are now devoting a portion of their space to the consideration of new remedies with especial reference to their therapeutical actions, medicinal properties, and uses. I shall content myself with a general sketch of the medicinal properties, action, and uses of podophyllum. Wood and Bache describe* podophyllum as "an active and certain cathartic, producing copious liquid discharges without much griping, or other unpleasant effect. In some cases it has given rise to nausea and even vomiting, but the same is occasionally experienced from every active cathartic. Its operation resembles that of jalap, but is rather slower, and is thought by some to be more drastic. It is applicable to most inflammatory affections which require brisk purging, and is much employed in various parts of the country, especially combined with calomel, in bilious fevers and hepatic congestions. It is also frequently used in connexion with bitartrate of potassa, in dropsical, rheumatic, and scrofulous complaints. In minute doses, frequently repeated, podophyllum is said to diminish the frequency of the pulse, and to relieve cough: and for these effects is sometimes given in hæmoptysis, catarrh, and other pulmonary affections."† Many American physicians consider that it may be used with perfect safety and surety, in all cases where mercury is indicated, as they say it produces all the good, and none of the evil effects of mercurial preparations.‡

The above properties of podophyllum are said to be concentrated in its active resinoid principle or resinoid extract—*podophyllin*, which has hence been termed *vegetable calomel;* but from what we know of the powerfully stimulating properties of podophyllin when applied externally, we believe that there are certain cases in which the preparations of the rhizome should be preferred to it; indeed, we think that *podophyllin* in some instances given alone might produce serious consequences. In America, indeed, it is commonly given in combination with other remedies, which are almost unknown in this country, as *leptandrin*, *iridin*, *hydrastin*, *asclepin*, *dioscorein*, *caulophyllin*, etc. These we shall refer to in future papers. I have been led to make these remarks, in consequence of having experienced in my own person very evident rubefacient and vesicant effects from a portion of the alcoholic solution having accidentally fallen upon the skin of my arm, and hence I should be led to expect much benefit from the use of this alcoholic solution as a counter-irritant in

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* *United States Dispensatory*, 11th edit., p. 606.

† See also Wood's *Therapeutics and Pharmacology*, vol. ii. p. 515; and Pereira's *Materia Medica*, vol. ii. part 2, p. 702.

‡ *American Journal of Materia Medica*, vol. iii. p. 17.

neuralgic and rheumatic affections, etc. I hope to see such a solution soon tried in this country, and anticipate favourable results from its employment for such purposes.* It is stated by some American physicians that the therapeutic action of podophyllin is entirely suppressed by the presence of much lactic acid, but that acetic acid does not interfere with it in any degree. If such be the case, it is clear, that the acidity of the stomach should be neutralized before podophyllin is administered, and that all saccharine matters which are capable of producing lactic acid should be avoided as far as possible during its use. Common salt is also stated to increase the activity of podophyllin.

Administration, Doses, and Preparations.—Podophyllum may be given in substance, or in the form of an infusion, decoction, tincture, or extract; or its active resinoid principle may be substituted for these preparations. The decoction was the original form employed by the Indians, who first made known this remedy; and until lately the powdered rhizome, or a strong decoction, were the usual modes of administering podophyllum. The uncertainty of the operation, or the great quantity required to produce, under such circumstances, the full effects of the remedy, led first to the use of an extract, and more recently to that of its active resinoid. In most cases there can be but little doubt that the active principle *podophyllin* may be judiciously and safely given to produce most of the effects ascribed to the rhizome; but, as already stated, there are certain cases, and especially where there is much gastro-intestinal irritation, where the employment of this principle is contra-indicated, and where the extract or tincture may be substituted with advantage; and indeed when either these or some other preparations of podophyllum can only be safely administered. As our knowledge of the effects of podophyllum becomes increased, it will probably be found advisable, in most cases, to combine it with other substances for use in disease. At the present day, the consumption of podophyllin must be very large in America and elsewhere, as at least eighty thousand ounces were prepared in the United States during the year 1860.

Extract of Podophyllum.—This is the only recognised preparation of the United States Pharmacopœia.

The following is the formula as there given:—"Take of Podophyllum, in coarse powder, *a pound*, Troy; Alcohol, *four pints* (of sixteen fluid ounces); Water, a *sufficient quantity*. Macerate the podophyllum with the alcohol for four days; then filter by means of a percolator, and when the liquid ceases to pass, pour gradually upon the podophyllum sufficient water to keep its sur-

* Since the above was written, upon referring to an American work, kindly lent to me by Mr. Bourdas, and with which I was previously entirely unacquainted, I find the counter-irritant effect of podophyllin has been prominently alluded to as follows:—"It possesses a degree of escharotic power, and when applied externally to fungous growths, will dissolve them down. It produces, however, too much inflammation to render it a desirable escharotic. Combined with sulphate of zinc and hydrastin, it has been found valuable as an application to cancerous growths. As a counter-irritant dissolved in alcohol, it is one of the most active and efficient that we have ever employed. It produces a rapid pustulation, which appears first in the form of minute vesicles filled with a serous fluid, which speedily changes to a whitish or yellowish pus. The superficial inflammation is at the same time quite severe. The pustules, as a general thing, are slow in healing. We employ it in chronic and obstinate cases of local neuralgic pains, spinal irritation, chronic hepatitis, pleuritis, and synovitis, morbus coxarius, etc." Mr. Ransom, a manufacturer of podophyllin in this country, has also since written to me, and he makes the following statements:—"It has one property I have not seen mentioned, viz. that of *causing soreness and little pustules in the nose* and inflammation of the eyelids when any particles of the podophyllin powder are allowed to remain many minutes in contact with the skin of those parts; so much so, that five persons employed in its preparation and in putting it into bottles, were all affected in the manner described. We are now very careful not to inhale any of the dust, but keep the mouth and nostrils covered with fine muslin or handkerchiefs, whilst engaged in handling or preparing it."

face covered. When the filtered tincture measures four pints, set it aside and proceed with the filtration until six pints of infusion are obtained. Distil off the alcohol from the tincture, and evaporate the infusion, till the liquids respectively are brought to the consistence of thin honey; then mix them, and evaporate so as to form an extract."

An alcoholic extract, as shown by the experiments of Mr. John R. Lewis, would probably possess more powerful purgative properties.* In the absence of any recognised formula for it however, or of any other preparations of podophyllum, we think it very desirable, at present at least, to recommend the extract or the active resinoid to be alone prescribed.

The dose of *podophyllum* in powder is, from ten to twenty grains; that of the *extract*, from five to fifteen grains; and that of *podophyllin*, as an active cathartic, from two to three grains, and as an alterative, from one-eighth to one-half of a grain. The griping effects which are frequently experienced when podophyllin is administered, may be generally relieved by giving the patient some warm aromatic stimulant tea, such as that prepared from ginger.

Dr. Coe states, that "in case podophyllin be taken by mistake, or in overdoses, it is readily counteracted by lactic acid, the most ready source of which is sour milk, or buttermilk, which should be freely administered."

Some specimens, illustrating Mr. Banner's process for rendering pills tasteless, were submitted to the meeting. See p. 487.

ON PLANTS IN A STATE OF LIFE OR ACTION, AND THEIR INFLUENCE IN NATURE.

A Lecture delivered at the Pharmaceutical Society of Great Britain, February 19th, 1862.

BY ROBERT BENTLEY, F.L.S., M.R.C.S. ENG.,

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The subject on which I have the honour to address you this evening at the desire of your Council, is that of the "Physiology of Plants," or, in other words, "Plants in a State of Life or Action, and their Influence in Nature." It is not a subject which admits of being elucidated in the lecture-theatre by a series of brilliant and striking experiments, at once appealing to the sense of sight and riveting the attention of the hearers, as was the case with the last Lecture delivered here by Professor Miller on Spectrum Analysis; but nevertheless it is one, as I trust I shall be able to prove to you as we proceed, of great interest to all, and of much practical value to the Pharmaceutist. I have been requested not to make my remarks too professional, but to give an elementary sketch of the subject, which should be interesting and intelligible to all, whether members or otherwise of the Pharmaceutical body. With this desire I shall endeavour to comply as far as possible, but at the same time I cannot forget, that the great object of the Pharmaceutical Society is the promotion of education amongst its members and students, and that therefore I should make my subject more especially practically useful to them.

When a seed in a vital condition is placed under favourable circumstances for its development, the living germ which it contains bursts through its integuments, and soon becomes a young plant capable of supporting an in-

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* *American Journal of Pharmacy*, vol. xix. 170.

dependent existence. We have in this Lecture to consider the means by which this young plant is enabled to continue its life and growth, and to perform its various functions.

In order that plants may live and grow, *food* is necessary, hence the substances required as food by plants must form the first subject of consideration; next in order we shall describe the function of *absorption*, or that process by which the food is taken up dissolved in water by the roots; then will follow the consideration of the means by which the fluid food thus absorbed is distributed through the plant, constituting the so-called function of *circulation;* next will be described the so-called function of *respiration* and that of *assimilation*, the objects of which are to aerate and elaborate the crude food absorbed by the roots, which, when it reaches the leaves and other external organs, is not adapted for the requirements of the plant, but is but little altered from the condition in which it was absorbed; and lastly, through the instrumentality of the two latter functions the food being rendered fit for the uses of the plant, we shall have to allude to the functions of *development* and *secretion*.

Food of Plants.—In the first place, we notice, that as plants are commonly destitute of locomotion, being fixed to the soil or to the substance upon which they grow, their food, in whatever it consists, must be derived from the media by which they are surrounded, that is, from the soil or from the air, or from both. In by far the majority of cases, plants take up their food both from the air by their leaves, and from the soil or medium in which they grow by their roots. Some plants, however, such as many Orchids, etc., derive their nourishment entirely from the air, and are hence termed *air plants* or *epiphytes;* and another class of plants called *parasites*, differ essentially from both epiphytic and ordinary plants, since their food, instead of being derived directly from the earth or air, as is the case with them, is obtained entirely or partially from the plants upon which they grow. This difference between epiphytes and parasites is commonly lost sight of, although practically it has very important bearings: thus *epiphytes* do not directly injure the plants upon which they grow, since they do not derive their nourishment from them; but *parasites*, by being nourished in a greater or less degree by the plants upon which they are placed, weaken them in a corresponding degree; and hence such plants, as for instance the Dodder, frequently do much injury to growing crops of Clover, Lucerne, Flax, etc. Many experiments have been tried for the purpose of discovering a means of destroying this pest of the agriculturist, without injuring at the same time the plants upon which it grows; and it has recently been found, that by watering the attacked crops with a saturated solution of sulphate of iron, the Dodder is completely killed.

No plants, whatever may be their nature, have the power of taking up nutriment except in a state of gas or vapour by their leaves, and other vitally active external organs, or in a state of solution by their roots.

The materials of which plants are made up, and which, as just mentioned, are commonly derived from the earth or the air, or from both, and which consequently form their food, are of two kinds, called respectively, the *organic* and the *inorganic*. The process of burning enables us conveniently to distinguish, to a great extent at least, the comparative proportions of these, and acquaints us with one of their distinctive peculiarities. Thus, if we take a piece of wood, or a leaf, or any other part of a plant, and burn it as perfectly as we are able, we find that the greater portion will disappear in the form of gas and vapour, but a small portion will remain as *ash* or incombustible material; the former constitute the *organic*, and the latter the *inorganic* or *earthy constituents*. Let me not be understood to say positively that by the process of burning we can obtain altogether accurate no-

tions of the comparative proportions and nature of the two kinds of constituents, but only an approximate one. No chemist or botanist would, I should think, say that such a process is perfect, they would only say that it is the best that science has hitherto afforded us. The recent discovery of the new and beautiful form of analysis by Mr. Graham, called Dialysis, bids fair to lead to more exact results upon the nature and proportions of the inorganic constituents of plants; and I am sure that all concerned with this Society will be glad to hear that the subject is now being investigated by Mr. Attfield, an old and distinguished student of this institution, and one whom I feel persuaded will do full justice to it. The relative proportion of the organic and inorganic constituents varies in different plants,but as a general rule, as far as has been ascertained at present, the former constitute from eighty-nine to ninety-nine parts, and the latter from one to about eleven parts, in every hundred of all plants.

1. *The Organic Constituents and their Sources.*—The *organic* are also sometimes called the *universal* constituents, because they are the same for all plants, whatever may be their nature. They are four at least, namely, carbon, oxygen, hydrogen, and nitrogen, and probably to these should be added sulphur and phosphorus, as these are necessary constituents of the nitrogenous cell-contents of plants. We shall content ourselves with having just noticed the two latter, and now proceed to make a few remarks upon the four former.

Carbon is the element which forms the largest proportion of all plants; its amount varying in different species, as a general rule, from about forty to fifty per cent. That plants do thus contain a very large proportion of carbon may be conveniently shown by one or two simple experiments. Thus, if we take a piece of wood, the weight of which has been previously ascertained, and convert it in the ordinary manner into charcoal or impure carbon, we shall find, that the charcoal thus produced will be of the same shape as the piece of wood from which it was prepared, and when weighed it will be found to have constituted a large proportion of its original substance. Another still more striking way of showing the large amount of carbon in plants is, by taking a well-known vegetable product, namely, sugar, dissolving it in water, and then pouring into the solution thus obtained some ordinary commercial sulphuric acid: the result will be the production of a spongy mass of impure carbon.

Carbon however is a solid which is insoluble in water, and cannot therefore be taken up by plants in an uncombined state, because plants, as we have seen, can only take up substances in a state of solution by their roots, or in a gaseous or vaporous condition by their leaves, etc. In a state of combination however with oxygen, the second organic constituent of plants, it forms carbonic acid, which is always present to some extent in a gaseous state in the atmosphere and the soil. This carbonic acid is soluble in water, and hence we have no difficulty in ascertaining the source of carbon and the condition and modes by which it is absorbed by the plant; thus it is taken up in the form of carbonic acid, principally by the leaves directly from the air in a gaseous state, and partly dissolved in water from the earth, by the roots.

Oxygen is, next to carbon, the most abundant organic constituent of plants; and the whole amount required as food appears to be taken up, combined with hydrogen in the form of water or vapour, and with carbon as carbonic acid. Some of the oxygen is therefore obtained by the roots from the soil, and the other portion from the air by the leaves.

Hydrogen, the third organic constituent of plants is principally taken up combined with oxygen as water or vapour; and partly in combination with nitrogen, as ammonia, a substance which is always produced in the decomposition of animal matter. Ammonia exists in a gaseous state in the atmosphere, and being freely soluble in water, the water when it passes through the air, dissolves it,

and carries it down to the roots, by which organs it is principally taken up. The roots also absorb the ammonia which is commonly contained in the soil.

Nitrogen, the fourth constituent of plants, is principally, if not entirely, taken up in the form of ammonia. Some believe that a small part is obtained from the nitric acid of rain-water, and the nitrates contained in the soil. Again, the experiments of M. Ville would lead to the conclusion, that plants, under certain circumstances, also absorb free nitrogen from the air; but the recent able investigations of Lawes, Gilbert, Daubeny, and Pugh, tend to negative rather than confirm his results.

Having now briefly noticed the sources of, conditions, and modes in which, the different organic constituents are derived and taken up, we see that the sources are the earth and the air, more particularly the latter: and that they are principally absorbed in the forms of carbonic acid gas, ammonia, and water; the latter of which is not only food in itself, as it is composed of oxygen and hydrogen, which are in themselves essential organic constituents of plants, but it is also the vehicle by which other food is conveyed to them.

2. *The Inorganic Constituents and their Sources.*—These are also called earthy or mineral constituents. We have already noticed, that the amount of inorganic matters found in plants is very much less than that of the organic; still, this portion is necessary to the life and vigorous development of most plants, and probably of all, although in certain Moulds, according to Mulder, no inorganic constituents have been detected. In some plants the amount of inorganic matter is so great, that their stems are rendered brittle thereby. This is the case with certain Cacti, from the dried tissue of which as much as 80 per cent. of inorganic matters have been obtained. Rhubarb-root also contains much inorganic matter; from dried Russian rhubarb as much as 35 per cent. has been obtained. It is said, that the amount contained in East Indian rhubarb is much less than this; and that in English rhubarb it is in still less proportion. From this difference in the amount of inorganic matter contained in the different kinds of rhubarb, it has been thought by some, that Russian rhubarb might be distinguished by its greater grittiness when chewed, and by adopting other means for more carefully estimating the amount of inorganic matter it contains. I have myself however found, in some cases, quite as much inorganic matter in English as in foreign rhubarbs; and hence, although such a character may be useful as a guide in some instances, it must not be absolutely depended upon as a distinctive test of the different kinds of rhubarb.

These inorganic matters are all derived from the earth. They are as follows:—Chlorine, Bromine, Iodine, Fluorine, Sulphur, Phosphorus, Silicon, Potassium, Sodium, Calcium, Magnesium, Aluminium, Manganesium, Iron, Zinc, and Copper. Some of these appear to be almost universally distributed in varying proportions, but others are only occasionally met with. These various constituents are not taken up in their simple states, but principally as soluble oxides, chlorides, bromides, fluorides, sulphates, phosphates, silicates, etc., dissolved in water by the roots; hence we see again how important a proper supply of water is to plants.

From the circumstance of the inorganic elements of plants being derived entirely from the earth, they are also called *telluric* constituents. The fact that certain species of Ficus and several other plants will grow suspended in the air for years, shows that such plants can live for a long period almost entirely upon the organic constituents derived from the air, as all the inorganic elements they then receive must be obtained from the water which is supplied to them. Again, Epiphytes or Air-plants must require but a very small proportion of inorganic food; as all that they receive must be obtained from water, and to some extent probably from the decaying bark of the trees upon

which they grow in their natural habitats. A complete chemical examination of the amount and nature of the inorganic elements of Epiphytes is much required.

While the organic constituents are the same for all plants, the inorganic constituents vary very much according to the nature of the plant. Thus, the Grass tribe generally, and especially Wheat, Oats, Barley, and Rye, contain much *silica* in their stems; the Equiseta in like manner contain silica, hence their common name of Polishing Rushes, from the use to which some of the species are applied. Cereal grains contain *phosphate of lime*. *Lime* is especially abundant in the stems of beans, peas, clover, etc.; *potash* abounds in many inland plants, and *soda* in those growing by the sea-side. If time allowed, a great number of other plants might be cited, to show the varying nature of the inorganic food of plants; but enough has been stated for my purpose, which has been especially to show, how important it is, that those who are engaged in agriculture, horticulture, and in the cultivation of our medicinal plants, should possess a knowledge of vegetable physiology and chemistry. Thus they should know the composition of the various soils and of the plants which they cultivate, as well as the nature of the compounds required by them, and the modes in which they are taken up; and then they would be able to adapt particular plants to the soils proper for them, and if such soils did not contain the substances necessary for their life and proper development, they could supply them in the form of manures.

The Plant in Action.—Having now described the nature and sources of the substances required as food by plants, we have in the next place briefly to show, how that food is taken up by them, distributed through their tissues, and altered and adapted for their requirements. The consideration of these matters involves a notice of the functions of vegetation, namely, of Absorption, Circulation, Respiration, Assimilation, Development, and Secretion. We commence with that of Absorption.

1. *Absorption.*—The root is the main organ by which food is taken up in a state of solution for the uses of the plant. Recent experiments would appear to show, that the leaves and other external organs in an active vital state, do take up a small portion of liquid food; but if such be the case, the amount thus absorbed is infinitesimally small under ordinary conditions as compared with that of the root; hence the root may be familiarly termed the mouth of the plant.

That the roots do thus absorb fluid matters may be proved by a very simple experiment. Thus, if we take two glasses of the same capacity, and pour water into them until it is at the same level in each, and then put the roots of a vigorously growing plant in the one, and expose both in other respects to the same influences of light, heat, and air, it will be noticed that the water will gradually disappear from the glasses, but from that in which the roots are placed far more rapidly than from the other without them, and hence the more rapid removal in the former case must be owing to the absorption of the roots.

Roots do not however absorb fluid matters from their entire surface, but absorption is almost exclusively confined to the cells and hair-like prolongations (*fibrils*) of their newly-developed portions, and the young parts adjacent to them. Hence we see the importance of preserving such parts as far as possible in the process of transplanting, otherwise the plants thus operated upon will languish or die, according to the amount of injury they have sustained.

We have now to consider how roots do thus absorb the fluid of the surrounding soil, and in order to explain this we must have recourse to the following experiment. Thus if we take a bladder, and fill it as far as we are

able with syrup, (which is here coloured for the purpose of being seen at a distance), and then attach carefully to its upper end a glass tube, and afterwards immerse the bladder thus prepared in a vessel of water; we shall soon see that the volume of the fluid within the bladder will be increased, as its rise in the tube will prove. Now, as there are no visible openings in the sides of the bladder by which fluid could enter into its interior, this increase in the volume of the interior fluid can only have taken place by the invisible passage of the water outside through the sides of the bladder into the thick syrup in the interior. Whilst this passage of water is taking place towards the interior syrup, there is also a contrary current by which a portion of the syrup will pass outwards into the water, as is proved by the sweet taste and colour which it gradually acquires. Hence the increase in the volume of the interior fluid measures the difference in the intensity of the two currents. This double current will continue as long as there is any material difference of density in the two liquids. The stronger current, namely that which sets from the thinner to the denser liquid, is termed *endosmose*, and the weaker, or that which sets from the thicker to the thinner, *exosmose*. The only conditions which are usually required for endosmotic action are, two fluids of different densities separated by a permeable membrane which is capable of imbibing such fluids. These necessary conditions for endosmotic action are found in the nature of, and conditions under which, the young extremities of roots are placed: thus these extremities are composed of a number of little cells, each of which may represent the bladder in the preceding experiment; the fluid in the interior of such cells is rendered denser than the fluid in the surrounding soil, in consequence of the vital actions which are going on in the plant; and the membrane forming their sides supplies the permeable partition. Hence as long as this difference of density is maintained between the external and internal fluids, which must necessarily be the case in the healthy condition of plants, so long the absorption of fluid, and therefore of food, from the soil, must continue. In thus alluding to the mode in which plants are enabled to absorb their food, one cannot but be struck with its marvellous simplicity, and at the same time its perfect adaptability to the conditions under which plants are placed.

2. *Distribution of Fluid Matters through the Plant, and their Alteration in the Leaves.*—Having now explained the process by which the food in a state of solution is absorbed by the roots, we have in the next place to describe the manner in which it is distributed through the plant, constituting what is commonly (although incorrectly), called the Circulation of the Sap, as the fluid thus passing through the plant is termed the Sap.

Ascent of the Sap.—The first subject we have to examine is the course which the sap takes. This may be readily ascertained by one or two simple experiments: thus, if we cut a stem through in the spring of the year when a great development of leaves and other organs is taking place, and when the sap is ascending rapidly, we shall find that fluid will exude from all parts of the surface of the section except the inner portion or heart-wood, but that it will flow most copiously from the outer portion or sap-wood. Other experiments may be made by placing plants in chemical or coloured solutions, and tracing their course, when it will be found in like manner, that these may be first traced in the sap-wood, then in the leaves, and lastly in the bark. It is evident therefore that so far as Dicotyledonous plants are concerned, that the sap ascends to the leaves principally through the young unincrusted wood-cells of the sap-wood or alburnum. As the fluid rises in the stem it is of a watery nature, and contains dissolved in it the various inorganic matters in the same state nearly in which they were absorbed by the roots. It also contains some sugar, dextrine,

gum, and other matters of a similar nature, which it has dissolved in its course upwards. In the ascent of the sap to the leaves and other external organs therefore, although it becomes more and more altered from the state in which it was absorbed by the roots; when it reaches the leaves, etc., it is still unfitted for the requirements of the plant, and is hence called *crude sap*. In the leaves and other green parts it is exposed to the influence of light and air by which it becomes altered in several particulars, as will be presently explained, and it is found, as the result of the sechanges, that the sap is then adapted for the uses of the plant, and hence is termed *elaborated sap*. This nutritive sap then descends through the inner bark and cambium layer towards the root from which it started; and by means of the medullary rays and the general permeability of the tissues of which plants are composed, it becomes gradually distributed to the different parts where new tissues are being formed, and where secretions are to be deposited.

Changes undergone by the Crude Sap in the Leaves, etc.—The important changes which the crude sap undergoes in the leaves and other green parts are now to be considered. They are:—1st. The *transpiration* or *exhalation* of the superfluous fluid of the crude sap in the form of watery vapour, by which it becomes thickened. This transpiration must not be regarded as a distinct function of vegetation, but simply as an accompaniment of the *second change* which occurs in the crude sap, and which is commonly called *respiration*. This latter function consists essentially, and perhaps entirely, in the absorption and decomposition of carbonic acid gas, by which carbon, that most important constituent of plants, is added to the crude sap. The *third change* is the formation out of the various inorganic and other unassimilated matters present in the crude sap, of the numerous organic products and secretions, which function is properly termed *assimilation*.

1. *Transpiration or Exhalation of Watery Vapour.*—This process is considered to be somewhat analogous to the perspiration of animals. It is influenced to some extent by the varying conditions of the atmosphere as to moisture and dryness; but the experiments of De Candolle, Henslow, Daubeny, and others, show, that light is the great agent which modifies transpiration. Thus they have proved by numerous experiments that the exhalation which takes place from the same plant when exposed to direct solar light, is very much greater than when submitted to the diffused light of day, and from a plant thus situated much more than from one in the dark. The amount of fluid matter absorbed from the soil, and the force of its transmission upwards through the stem, must be also necessarily regulated by the quantity exhaled; for as watery vapour is transpired, there is created a demand for fluid from below to supply the deficiency thus occasioned, and accordingly the functions of circulation and absorption are affected in proportion to that demand. The mutual dependence of these processes of vegetation may be illustrated by the combustion of fluid in the wick of a spirit-lamp. Thus, if we set fire to the spirit at the top of the wick, the combustion which then takes place creates a demand of fluid from the reservoir below in proportion to its intensity; and hence the amounts consumed, transmitted through the wick, and absorbed from below, are directly dependent upon one another. If the flame be blown out, with the cessation of combustion so will absorption and transmission terminate, because where there is no demand there can be no supply. In the same way transpiration from the external organs of plants modifies and regulates the force of circulation and the amount of absorption. Hence we find that all agents which increase transpiration, increase in like manner the force of circulation and the amount of fluid absorbed; and we see also that according to the amount of light to which a plant is exposed, so will be the activity of transpiration, circulation, and absorption.

We learn from the above facts how important is a proper supply of light to a plant, for if it is wanting, transpiration soon altogether ceases, and is speedily followed by the cessation also of absorption in consequence of the plant becoming gorged with unremoved fluid matters. Hence *one* reason why a plant becomes unhealthy, and ultimately languishes and dies, if it be removed and kept entirely from light. There are many important practical facts which arise from a knowledge of this action of solar light, which have a direct appliction in the process of transplanting, keeping flowers, etc., but these we have not time to allude to; but there is one fact of more direct importance to Pharmaceutists, which we cannot pass over. It has reference to the time at which medicinal plants should be collected for use, for a knowledge of the action of solar light upon vegetation shows us the necessity of gathering such plants, if we would have them in the most active conditions, in dry, warm, sunny weather, as under other circumstances, that is, if gathered after a succession of dull, dreary, cold, damp, or wet days, their active secretions will be so mixed up with inert unassimilated fluid matters, as to sensibly diminish their medicinal properties, and materially to increase the difficulty of making eligible preparations from them which will keep unaltered for a length of time. We shall presently find, however, that the unhealthy state of the plant under the above circumstances is not due simply to the checking of transpiration, but that there are other important changes which are also dependent for their proper activity upon the presence of light, and that therefore it is to these also that the injurious effect produced upon plants in diminished light must be in a great measure attributed.

This transpiration of watery vapour takes place almost entirely through the small openings which are situated in the general integument which covers the surface of the leaves and other young external organs, and which are termed stomata, and hence as a general rule the quantity transpired will be in proportion to their number. The presence or absence of a true epidermis, and the various modifications to which it is liable, have also an important influence upon the transpiration of watery vapour.

The quantity of watery vapour thus transpired by plants has been the subject of various experiments. The most complete observations upon this point were made by Hales some years since, when he computed that the transpiration of plants was seventeen times greater in proportion to surface than the perspiration of animals. A simple experiment will at once give some idea of the amount of fluid exhaled by them. Thus, if a common glass tumbler be held with its mouth downwards immediately over the leaves of a vigorously growing plant, freely exposed to the sun, on a hot dry day, it will soon become dim in the interior by the watery vapour which has passed from the plant into it, and if the glass be allowed to remain in its position, the fluid will soon accumulate and run down the sides in drops. By some carefully conducted experiments of Hales, it was found that a common Sunflower $3\frac{1}{2}$ feet high, weighing 3 pounds, exhaled on an average about 20 ounces of fluid in the course of the day; a Cabbage-plant, about 19 ounces per day; a Vine, from 5 to 6 ounces; and a Lemon-tree, 6 ounces on an average, in a day. If such a large amout of fluid be thus given off by single plants, what an enormous and almost incalculable quantity must be exhaled by the whole vegetation of the globe, and it is in this manner that a large supply of moisture is constantly thrown off into the atmosphere, and hence we can readily understand *one cause* which leads to the difference between the air of a thickly wooded country and that in which vegetation is more or less scanty; for the former will be always in a damp condition, while the latter will be comparatively free from humidity. Thus we see that a country to be perfectly healthy should have the proportion of plants to a particular area carefully

considered; for while, on the one hand, too many plants are generally prejudicial to health by the dampness they produce, on the other, a deficiency or want of them will produce an equally injurious dryness. The same circumstances have an important bearing upon the fertility, or otherwise, of the soil, and thus have an indirect influence upon the health of the inhabitants. Thus, it is a fact, that as vapour is constantly given off by plants, rain is more abundant in those regions which are freely supplied with forests than in those which are comparatively free from them; and we find accordingly that a great change may be produced in the climate of a country by clearing it of forests; for while an excessive amount of vegetation is injurious to the healthy growth of plants, if the country be deprived of them it will become entirely barren from its extreme dryness. By inattention to these simple but most important facts, which clearly indicate that open land and that furnished with plants should be properly proportioned the one to the other, many regions of the globe which were formerly remarkable for their fertility, are now barren wastes; and in like manner, many districts formerly noted for their salubrity, have become almost or quite uninhabitable. Who could have supposed, at first sight, that the invisible and apparently insignificant exhalation from plants would have had such important effects upon the healthiness and fertility of different parts of the globe? This is, however, only one of the numerous and important facts which are made known to us by studying the functions of the wonderfully organized beings contained in the Vegetable Kingdom; and hence we see the importance of keeping in view, in all our sanitary arrangements, the influence exerted upon the atmosphere by the exhalation of plants.

2. *Absorption and Exhalation of Gases.*—We now pass to consider the second change which the crude sap undergoes in the leaves and other green parts of plants, and which is commonly termed Respiration. This function essentially consists in the absorption and decomposition of carbonic acid gas, and in the exhalation of oxygen. The experiments of Senebier, Draper, Mulder, Cloez and Gratiolet, and many other chemists, also led to the belief that nitrogen was given off by the green parts of plants under the direct influence of sun-light; but the recent most important experiments of Boussingault have shown, that this is an error, and that the gas thus supposed to be nitrogen is in reality carbonic oxide, which is accompanied likewise by a certain proportion of some kind of carburetted hydrogen. There was no scientific conclusion which was thought to be more conclusively established till these experiments of Boussingault than that the green plants under the influence of solar light absorbed carbonic acid gas from the atmosphere or water in which they grew, decomposed it, fixed the carbon which resulted from that decomposition in their tissues, and gave back the oxygen. These experiments of Boussingault show that, in many cases at least, the decomposition of carbonic acid is imperfect, and that with the evolution of free oxygen, carbonic oxide is also given off. These changes do not take place in the deep-seated tissues of the plant, nor in the epidermal cells, but in those only immediately beneath the epidermis. It is by this decomposition of carbonic acid under the influence of solar light, that plants obtain by far the largest proportion of carbon, which, as already noticed, forms such an essential constituent of their food.

Whilst the absorption of carbonic acid and evolution of oxygen and carbonic oxide is thus taking place by day, it is supposed by most observers, that in the absence of light a contrary change takes place,—oxygen being then absorbed and carbonic acid exhaled. If the green parts of plants do then give off carbonic acid gas, which we doubt, the amount of oxygen absorbed is very much less than that which is exhaled by them under the influence of solar light; for the experiments of Saussure and Daubeny show, that

if plants be enclosed in jars containing ordinary atmospheric air, and be supplied under such circumstances with carbonic acid, the amount of oxygen gas in the contained air becomes increased.

Till the recent experiments of Boussingault all experimenters agreed in admitting, that the respiration of plants in consequence of the evolution of free oxygen by day, had a most important influence in nature. This will be at once evident, when I state that it has been hitherto regarded as the only known process by which the oxygen gas so essential to our existence, and which was constantly being removed from the atmosphere we breathe by the respiration of man and other animals, by the process of combustion, by oxidation of mineral matter, and by other processes which are constantly going on upon the globe, was restored to it in a free condition. It has been supposed that if plants had not this power of restoring oxygen to the air by their respiration, it would necessarily happen that, the proportion of oxygen in it would gradually diminish, and in its place we should have a corresponding amount of the poisonous carbonic acid gas, and the effect would be ultimately that the air we breathe would become unfit for animal life, precisely as the air of a close room where charcoal is burned, would, from similar changes, destroy life. But such is not the case, as we know from common experience; and chemical analysis also shows, that the amount of oxygen present in the air under ordinary circumstances, is not liable to appreciable variation; hence it has been concluded, that whilst man and other animals vitiated the atmosphere by robbing it of oxygen gas by their respiration, and by the various processes which are necessarily carried on by them, plants purified it by restoring that vitally necessary gas in their respiration.

In the same way plants have been hitherto regarded as the only means employed in nature to purify water, and render it habitable by animals. Upon this hitherto acknowledged compensating influence of plants, our vivaria have been constructed. There can be, I think, but little doubt that plants do have, to a great extent at least, the purifying influence hitherto ascribed to them, for all our common experience and the results of the chemical analysis of the air appear to prove it; but how far this influence may be modified by the discovery of Boussingault of the evolution of a certain proportion of such a poisonous gas as carbonic oxide is known to be, at the same time with oxygen, it is at present impossible to say; but the subject is one of the very greatest importance, and cannot but repay a careful investigation. Boussingault has thrown out a suggestion, that in some cases, so far from plants purifying the air, that on the contrary, the atmosphere of marshy districts, where they are in excess, owes to them its insalubrity. Probably, also, *one cause* of the unhealthiness of densely wooded districts may be due to the evolution of carbonic oxide gas. With reference to the above conclusions of Boussingault's, I would remark, that up to the present time, his experiments have been solely made by putting plants or the green parts of plants in water previously impregnated with carbonic acid. The conditions under which carbonic oxide was formed by plants were therefore not altogether natural ones; and hence, it is desirable, that future experimenters should test plants growing in the air as well as in water in as nearly as possible their natural states of existence.*

Let me here briefly notice a widely-spread notion that plants, when grown in rooms where there is but little ventilation, and, therefore, especially in our sleeping apartments, have an injurious influence upon the air contained in them. This idea has arisen from the circumstance of the green parts of plants, when not exposed to solar light, being supposed to have a contrary

* See p. 479 of the present number for a detailed account of Boussingault's experiments.

effect upon the atmosphere to that which they have when submitted to its influence; that is to say, that they then absorb oxygen and give off carbonic acid gas, instead of absorbing carbonic acid gas and giving off oxygen. The amount of carbonic acid gas, however, which would be then given off by plants would be so extremely small, that it could have no sensible effect upon the atmosphere in which they were placed. It might be readily shown that it would require some thousands of plants, in this way, to vitiate the air of a room to anything like the extent of that of a single animal, and that, therefore, the idea of a few plants rendering the air of close rooms unwholesome by such an action, is altogether erroneous. It is probable, however, that the odours of plants may affect injuriously, to some extent at least, certain individuals of delicate organization or peculiar idiosyncrasies.

Wardian Cases.—Whilst a due supply of carbonic acid and oxygen gas are necessary in suitable proportions to the due performance of the proper functions of plants, other gases when mixed in the air in which they are placed, act more or less injuriously upon them; and it was in order to protect plants from the injurious influences thus exerted upon them by the soot and air of large towns, etc., that Mr. Ward some years since introduced a plan of growing them under closed glass cases, which has been found to succeed admirably. These cases consist simply of a box or trough in which a suitable soil is placed; and in this the plants are put, and the whole is covered by a closely fitting glass case. It is necessary at first to water the plants freely. When plants are grown under such conditions, upon exposure to light and air, transpiration takes place from the leaves, etc., as under ordinary conditions of growth; the watery vapour thus transpired is, however, here condensed upon the surface of the glass case which encloses the plants, and ultimately runs down again into the soil, and is thus brought into contact again with the roots of the plants, to be again absorbed and exhaled; and these changes are continually repeated, so that the plants are always freely exposed to moisture, and do not require a further supply of water for commonly a considerable period. Those plants especially which succeed best in a damp atmosphere, as is generally the case with Ferns, do exceedingly well in such cases. The most important influence, however, which is exerted by such cases, is the protection of the contained plants from the immediate contact with air impregnated with injurious matters; for in consequence of the glass cover fitting closely to the trough in which the plants are placed, the external air in its passage to them has to pass through the very narrow crevices beneath the cover, and in so doing becomes filtered, as it were, in a great measure from its impurities, before it is brought into contact with them.

Besides the use of such cases in growing plants luxuriantly in those places where under ordinary circumstances they would perish, or at all events grow but languidly, they have a still more important application, for they have now been most successfully employed in transporting plants from one country to another, which, under ordinary circumstances, would have died in their transit; and whose seeds, moreover, could not have been transported without losing their vitality. The action of Wardian cases in this mode of transporting plants is twofold; thus, in the first place, the plants are then protected from the influence of salt breezes, which are, in most instances, very injurious to plants; and secondly, the atmosphere of such cases, by remaining in a quiet state, protects the plants from all rapid changes of temperature, which, in all circumstances, is so prejudicial to their vitality.

3. *Formation of Products and Secretions.*—By the changes thus produced in the crude sap by its exposure in the leaves and other green parts to light and air, the materials which it then contains are left in a very active chemical condition, or in a state prone to change, and therefore freely combine to-

gether, by which various substances are formed, such as starch, sugar, gum, proteine matters, etc., which are directly concerned in the growth and nutrition of plants; as well as others, such as resinous and colouring matters, various acids, numerous alkaloids, and other important substances, which, as far as we know at present, perform no further active part in the plant, and are accordingly removed from the young and vitally active portions, and are either stored up in the older tissues as *secretions*, or removed altogether as *excretions*. The production of these organic substances is properly termed Assimilation.

We learn from what I have just stated, that there are two series of compounds formed by the action of light and air in plants, one series of which have for their object the nutrition of the plants in which they are formed, and are directly concerned in their growth and development,—and another series called secretions, which play no active part in the plant after their perfect formation. The latter (*secretions*) are also commonly formed later in the life of the plant. These facts teach us how important it is not to manure plants which are used in medicine too freely, as by so doing they grow too luxuriantly, and become fattened as it were; while, at the same time, no increase at all events, and, as I believe, a sensible decrease takes place in the amount of their secretions, by which their medicinal properties are lessened. Under any circumstance the addition of a large quantity of unstable compounds to the juices containing the secretions we require, renders such plants, as a rule, ill adapted for the production of eligible and stable preparations. When plants are grown for use as vegetables, the opposite plan should be adopted, as our object is then to form nutritive compounds, and not as before, active secretions. It is very probable, however, that as our knowledge of vegetable chemistry and physiology increases, when we become perfectly acquainted with the action and uses of artificial and other manures, that by their judicious use, the medicinal properties of plants may be increased rather than diminished. The remarks I have made above are simply intended to apply to the now frequently adopted plan, that of indiscriminate and overmanuring medicinal plants.

There is another important practical fact, which, as far as I am aware, has hitherto been entirely overlooked, but which arises from a knowledge of the later development and difference in function of the secretions and products. It is this: it is well known that in the process of flowering and fruiting, a great supply of nourishment is required; hence it was said by vegetable physiologists, that when the herbaceous parts of plants were required for medicinal uses, they should be taken, as a general rule, before the process of flowering; the practical man however came forward and said no, take them when the flowering stage has somewhat advanced, as it is at that period that I can obtain the most active and stable preparations from plants. I think we may show that the latter is correct (provided that the flowering stage has not advanced to any very great extent), as follows:—In the process of flowering the only compounds that are taken up in any amount are those which are concerned in the growth and development of new tissues; no further growth can therefore take place, to any extent at least, in the vegetative organs of the plant; but the secretions by the removal of these products become more concentrated, and the organs in which they are produced by being left for a longer period in connection with the plant, have time to elaborate them more perfectly. This is, I believe, the real explanation of what has always been regarded as a difficult problem to solve.

We have shown above, that without leaves or other organs of an analogous nature, no growth to any extent can take place, or any secretions be formed in the plant. Thus the floral leaves, and the green parts of the flower itself,

have a similar effect as the leaves themselves; even the young herbaceous parts, from which the leaves and other organs arise, are also directly concerned in the formation of products and secretions. This assimilating power of the young green herbaceous parts is commonly lost sight of, but in reality the structure of these parts is essentially the same as the leaves, except that their tissues are somewhat more compact and differently arranged; hence in proportion to amount of matter they do not expose so large a surface to the action of air and light as leaves, and as the process of assimilation only takes place in the cells immediately below the epidermis, their powers of forming products and secretions is somewhat less intense, but the difference between the parts immediately in contact with the leaves and the leaves themselves must be very slight. Indeed I am by no means certain, but that the young herbaceous parts frequently contain quite as much, or even more active secretions than the leaves themselves; thus, if the latter organs be left on the stem till they have passed their active vital conditions, the active secretions they contain will have passed to a great degree into the young stalks in their passage downwards to the main stem, and hence they would be then probably more active than the leaves, as they would in such a case not only be assimilating organs, but also the receptacle for the products and secretions formed in the surrounding parts. The most convincing proof that I can adduce, of the capability of young succulent parts to form products and secretions, is in the case of Cacti, Euphorbias, etc., which have commonly no leaves or other analogous organs, but the plants are formed of a succulent stem or stems, from which the flowers arise; nevertheless, as is well known, and in the case of some of the Euphorbias especially, the secretions produced are of a very active nature. I might pursue this subject further, but enough has been said, I think, to show that in practice, in making preparations from herbaceous plants (to which the above remarks are intended especially to apply) we may consider the young vitally active parts in immediate contact with the leaves as not materially differing in activity from them, and that consequently, they may be safely as well as economically used with them.

We learn also from what has been now stated, that without the exposure of even leaves and other parts to light, no proper assimilation of the various matters taken up by the plant can take place; and that hence, if a plant be put into the dark, it becomes blanched in consequence of the non-development of green matter, and that, moreover, no woody matter is then formed, and but few of its peculiar secretions. It will be seen therefore, that when we speak of assimilation, etc., as taking place in the green parts of plants, we mean really the young vitally active external parts which become green by being exposed to light and air, for the green colour is not the cause but one of the effects of assimilation. The effect of the absence of light upon plants is well shown, when a potato tuber sprouts in the dark; in which case the whole of its tissues are seen to become blanched (etiolated), and ultimately to die; or when potatoes are reared under a diminished supply of light, as when they are grown in an orchard, or under trees, under which circumstances the tubers are what is called watery, in consequence of the small quantity of starch then produced. Hence we see the reason also, why the secretions of plants are less perfectly or more sparingly formed in cold dull summers than in light sunny ones, and that consequently medicinal plants are more active in such seasons as the latter.

Again, as light is thus seen to be essentially necessary for the formation of the secretions of the plant, it follows, that when the secretions of particular plants which are otherwise agreeable, are injurious or of unpleasant flavour, that by growing them under diminished light or in darkness, they can then be used as vegetables for the table, as is the case with Celery, Endive, Sea-

kale, etc. For the same reasons the plants of warm and tropical regions, where the light is much more intense than it is in this country or in other cold and temperate regions, are commonly remarkable for the powerful characters of their secretions, as is well illustrated by the strong odours of their flowers, and the rich flavours of their fruits, as contrasted with those of cold and temperate regions.

Again, as the production of secretions depends upon the intensity of light, t frequently follows, that a plant of a warm or tropical region which naturally secretes a substance which may be of great value as a medicinal agent, or useful in the arts, etc., when transported to this or any other climate in which the intensity of the light is much less than it is in its native country, that the secretion is not formed at all, or in diminished quantity. Even if such plants be placed in our hot-houses, where they may be submitted to the same degree of heat as they obtain naturally in their native countries, their secretions are not formed, because light is the main agent concerned in their formation, and we cannot increase the amount of light like heat by artificial means.

Another cause which commonly interferes with the formation of the secretions of plants of warmer regions when grown in our hot-houses, is the want of a proper and incessant supply of fresh air to facilitate transpiration, etc.

The above facts are of great interest, as they have an important bearing upon the growth of plants and fruits for the table, as well as in a medicinal and economic point of view. At present, however, much remains to be discovered before we can be said to have anything like a satisfactory explanation of the causes which influence the formation of the secretions of plants; for it is found that the same plants when grown in different parts of Great Britain, where the climatal differences are not strikingly at variance, or even at the distance of a few miles, or in some cases a few yards, frequently vary much as regards the nature and activity of their peculiar secretions. A striking illustration of this fact is mentioned by Dr. Christison, who found that some umbelliferous plants, as *Cicuta virosa* (Water Hemlock), and *Œnanthe crocata* (Hemlock Water Dropwort), which are poisonous in most districts of England, were innocuous when grown near Edinburgh. The causes which lead to such differences are at present obscure, but the varying conditions of soil and moisture under which such plants are grown, have doubtless an important influence upon their secretions. In a pharmaceutical point of view, so far as the active properties of the various medicinal preparations obtained from plants are concerned, this modification in the secretions of plants by such causes is of much interest, and would amply repay investigation, for it cannot be doubted but that each plant will only form its proper secretions when grown under those circumstances which are natural to it, and that consequently any change from those conditions will modify to some extent the properties of the plant. I cannot but believe that here we have an explanation to some extent, of the cause of the varying strength of medicinal preparations obtained from plants grown in different parts of this country, or in different soils, etc.

If future experiments should demonstrate in a conclusive manner that wild plants are more active than those under cultivation, it will be necessary to ascertain what are the conditions of heat, light, exposure, soil, moisture, etc., which are most favourable to the full development of the medicinal properties of each plant, in order that the cultivator may place them, as far as he is able, under such conditions. Many of our medicinal plants are now employed so extensively, that they could not be obtained in any proportion to the demand for them from wild localities, and hence cultivation must be resorted to to keep up the necessary supply; we would urge therefore upon our cultivators of medicinal plants to study to place the plants they cultivate, in

as nearly as can be ascertained at present, their natural conditions of growth, and then we have no fear that their medicinal properties will be sensibly diminished; indeed, we see little reason to doubt, but that as our knowledge of vegetable physiology and chemistry increases, when the conditions under which the different secretions of each particular plant have been thoroughly investigated,—we may increase rather than diminish their active properties by proper cultivation.

Descent of the Sap.—We have already stated that, the crude sap after having been transformed into the elaborated sap in the manner now described, passes from the leaves, etc., to the inner bark and cambium region of Dicotyledons, and afterwards descends towards the roots, and is carried inwards by the medullary rays, and that by such means and by the permeable nature generally of the tissues of plants it is distributed to those parts where growth is taking place, or where secretions are to be deposited.

With these remarks I must conclude, although I am now only upon the threshold of the many practical facts which arise from an acquaintance with the principles of vegetable physiology. It is impossible, however, to do justice to so comprehensive and important a subject in the space of one lecture; but if, in this glance, I have in any way succeeded in removing the mists which have previously obscured or altogether hidden the glorious prospect beyond, and have thus induced you to pursue the subject further till the prospect becomes more and more unfolded to your view, I shall have gained my purpose; for depend upon it that, the study of the wonderfully organized beings belonging to the vegetable kingdom, will not only be the means of imparting most valuable practical information, which cannot but be of essential service to you in the practice of your responsible profession, but also afford you an agreeable recreation, and have a purifying and elevating influence upon the highest and noblest faculties of your minds.

PHARMACEUTICAL MEETING, EDINBURGH.

The third meeting of the present Session was held in George Street Hall, on Thursday evening, the 20th current, at nine o'clock; Mr. Ainsley, President, in the chair. There was a very numerous attendance.

Dr. Stevenson Macadam gave an interesting Lecture on "Spectrum Analysis," and in the course of his remarks introduced a great variety of experiments, some of which, by the aid of a powerful electric light, were of a very beautiful and novel character. The meeting was numerously attended, and from the hearty bursts of applause which frequently greeted the lecturer, showed some appreciation of the perfect success which attended the various experiments. At the close of the lecture a special vote of thanks was proposed by Mr. Kemp, seconded by Mr. Mackay, and carried with acclamation to Dr. Macadam, for his able and lucid address, and explanation of the phenomena attending the exhibition of this wonderful and interesting subject.

Mr. Mackay laid before the meeting a few of the New Safety Poison Corks, invented by Mr. Bird, of Liverpool. These corks are intended to prevent cases of accidental poisoning, and are made by having the top formed of wood, and so cut as to present several sharp, angular points. Thus constructed, any one, even in the dark, would be sensibly reminded, by a slight prick in attempting to uncork a bottle, that the contents were of a dangerous description. The cost is trifling, and the inventor sanguine that when known they will be generally used. Each cork has a piece of thin flexible wire, by which it can be secured to the neck of the phial.

The Secretary made an intimation regarding the time appointed for receiving Prizes. All Papers intended to compete either for the President's

Prize, or that of the Register Fund, require to be lodged with him by the first week in March.

The Regulations adopted by the Committee in London as to the exhibition of drugs, chemicals, and pharmaceutical preparations in the forthcoming National Exhibition, were read, and the meeting thereafter adjourned.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Eighth General Meeting was held at the Royal Institution, February 6th, 1862; the PRESIDENT in the chair.

The minutes of last meeting having been read, Mr. Joseph Marples was elected a member, and Mr. Thomas W. Evans an associate of the Society.

Mr. T. Sherlock exhibited a specimen of thenardite, or anhydrous crystallized sulphate of soda, a mineral found in great abundance in the neighbourhood of Madrid, in Spain.

The PRESIDENT delivered a highly interesting lecture "On explosive mixtures of hydrocarbons with air," illustrated by numerous experiments.

The Ninth General Meeting was held at the Royal Institution, February 20th, 1862; the PRESIDENT in the chair.

The Chairman exhibited a new pocket microscope, made by Salmon, and particularly well adapted for the detection of adulterations, and for commercial purposes generally. Mr. H. Bird exhibited some of his patent corks for the prevention of accidental poisoning.

Mr. H. S. EVANS gave a lecture "On the practical applications of polarized light," which he illustrated by means of the oxy-calcium light.

Mr. R. Tiernan and Mr. S. Banner have been elected members of the Council, in place of Mr. W. Wright and Mr. H. Coupland, resigned.

ORIGINAL AND EXTRACTED ARTICLES.

REPORT OF THE

RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATIONS,

AND OF THE

APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On the Nature of the Gas evolved from Leaves during the decomposition of Carbonic Acid.—M. Boussingault has recently presented a memoir to the French Academy, detailing a series of interesting and highly valuable experiments on the so-called respiration of plants, by which he has been led to the discovery of a new and unexpected fact in connection with this process.

Our knowledge of the influence which the green parts of plants exercise on the atmosphere has been but little advanced since the memorable researches of Théodore de Saussure. The separation of the elements of carbonic acid by leaves under the influence of the sun's light, the assimilation of the carbon and the elimination of oxygen, still expresses the extent of our acquaintance with phenomena discovered in the course of the last century; and no sufficiently precise determination has since been obtained of the connection existing between the volume of the oxygen evolved and the carbonic acid decomposed. It is true that by growing herbaceous plants in an atmosphere of known constitution, Saussure came to the conclusion that

a fixation of oxygen takes place simultaneously with the assimilation of the carbon, the volume of the evolved oxygen being notably inferior to the volume of the carbonic acid from which it was obtained. The following are the results of five of Saussure's experiments :—

	Carbonic Acid disappeared.	Oxygen appeared.	Nitrogen appeared.
1. Periwinkle	431 c. c.	299 c. c.	139 c. c.
2. Water Mint	309	224	86
3. Lythrum Salicaria	149	121	21
4. Pine	306	246	20
5. Cactus Opuntia	184	126	57

Taking the mean of these, it appears that plants, in assimilating the carbon from 1379 cubic centimètres of carbonic acid gas, only set at liberty 1009 c. c. of oxygen; consequently 370 c. c. must be retained in their organism, carbonic acid gas containing precisely its own volume of oxygen. These experiments however are by no means conclusive or trustworthy. In the first place, they cannot indicate whether the *green parts* of plants retain any portion of the oxygen of the carbonic acid, because the whole plant was exposed in the atmosphere, and it is known that the uncoloured portion is capable of absorbing oxygen. Consequently the roots might have absorbed a portion of the evolved gas, and so have caused the apparent reduction. Secondly, the appearance of so much nitrogen suggests the possibility of some fault in the apparatus, allowing diffusion between the internal and external atmosphere to take place.

Saussure was not struck by the appearance of this nitrogen. He considered its production to be connected with the decomposition of the carbonic acid, and stated that leaves, in exhaling the oxygen, also disengage nitrogen. M. Boussingault, however, shows that this would be impossible, to the extent indicated in Saussure's experiments, because with some of the plants, the quantity operated upon could not contain the amount of nitrogen represented as evolved. Nevertheless, all experimenters since Saussure have indicated the presence of nitrogen in the evolved oxygen. One of our distinguished chemists, Professor Daubeny, has stated that he never obtained this oxygen free from nitrogen. M. Drapper asserts that the gas elaborated by the *Pinus tæda* and the *Poa annua*, never contains less than from 22 to 49 per cent. of nitrogen. The most recent researches on this subject were conducted with great care and ingenuity by MM. Cloez and Gratiolet. They placed, in July, eight branches of *Potagometon perfoliatum*, having a volume of 184 c. c., in water which had been deprived of air by ebullition, and then slightly impregnated with carbonic acid. Every day the gas disengaged under the influence of light was collected for analysis. The following are the results which were obtained :—

	Vol. of gas evolved.	Composition in 100 parts. Oxygen.	Nitrogen.
1st day	348	84·30	15·70
2nd „	569	86·21	13·79
3rd „	624	88·00	12·00
4th „	315	89·74	10·26
5th „	226	90·47	9·53
6th „	162	92·85	8·15
7th „	120	95·66	4·34
8th „	86	97·10	2·90

It will be seen that in these experiments the percentage of nitrogen diminishes every day, the oxygen becoming purer as the exposure is prolonged; exactly as if the air retained in the vegetable tissue or in the water had been successively expelled by the oxygen.

In the summer of 1844, M. Boussingault made a number of trials to obtain pure oxygen from the green parts of plants, submerged in water slightly acidulated with carbonic acid. All the precautions which forethought and experience could suggest were adopted; such as the expulsion of the air by ebullition, the employment of a vacuum, etc., but without success. The results obtained were in accordance with those of MM. Cloez and Gratiolet, and in a certain sense, in opposition to those of M. Drapper, inasmuch as the oxygen came off purer in proportion as the experiment was prolonged.

Ultimately however he was led to make the following experiment. Two distinct apparatuses, precisely alike in construction and arrangements, were prepared, each containing a litre of water impregnated with carbonic acid after the air had been removed by boiling. Into one of these, ten leaves of lilac were introduced, and it was then exposed to the sun for two hours. The gas collected, the carbonic acid absorbed by potash, and the oxygen removed by phosphorus, when five cubic centimètres of nitrogen were obtained. The other apparatus was also exposed for two hours. It only differed from the first by containing no leaves. The gas was collected, the carbonic acid absorbed by potash, and the oxygen removed by phosphorus, when a residue of four cubic centimètres of nitrogen was obtained.

This experiment at once indicated the real difficulty of removing the air dissolved in the water or confined in the tissues of the plant. In order therefore to determine the question whether plants evolve nitrogen as well as oxygen, during the decomposition of carbonic acid, the author had recourse to a different principle of operation. Instead of endeavouring to exclude and remove all atmospheric air as in the previous experiments, he carefully ascertained the proportions of oxygen, nitrogen, and carbonic acid present in the water and leaves which he was using, before the exposure to light. By again determining these gases after the exposure, he was enabled to ascertain whether the proportion of nitrogen had increased, and also what relation the increase of oxygen bore to the decrease of carbonic acid. Thus, in each experiment he employed three apparatuses, similar in every respect and of very simple construction. These were worked simultaneously. In the first, the gases dissolved in the water were extracted; in the second, the gases in the water *plus* the air confined in the tissues of the leaves; and in the third, the gases present after the apparatus, containing the leaves, had been exposed to light. The extraction of the gases was effected by boiling *in vacuo*. The exposure to light varied fromone to two hours.

The following, taken from one experiment, shows the method of getting out the results:—

GASES EXTRACTED FROM WATER AND LEAVES.

	CO_2	O	N
Before exposure	56·48	3·47	9·84
After exposure	15·27	46·47	10·28
	Disappeared...41·21	Appeared...43·00	Appeared...0·44

The following table indicates the results which were obtained from a long series o experiments with different plants:—

Name of Plant.	Carbonic Acid disappeared. c.c.	Oxygen appeared. c.c.	Nitrogen appeared. c.c.
Oleander	26·5	27·3	0·3
Peach	76·4	77·0	0·7
Lilac	38·6	37·9	0·3
Willow	77·2	74·2	1·1
Pinus maritima	85·9	88·5	0·9
Aquatic plants	80·8	76·4	0·8
Water Mint	78·5	75·7	0·9
Oak	49·8	47·1	0·2
Almond-tree	24·7	23·1	0·3
Aquatic plant	50·4	48·9	Undetermined.
Do. do.	54·9	51·3	0·5
Periwinkle	26·5	26·7	0·3
Sassafras	30·0	29·0	0·5
Haricot Bean	22·0	21·0	0·2
Nettle	30·1	31·2	0·5
Oats	30·7	29·9	0·3
Carrot	44·6	42·6	0·6
Vine	17·2	15·5	0·2
Thuya	28·7	28·8	Undetermined.

Out of twenty-five experiments, eight indicate the oxygen evolved to be slightly greater in volume than the carbonic acid absorbed; in the remainder the contrary is the case. Taking the mean of the whole, it is found, 1st, that for 873·5 c.c. of carbonic acid absorbed, there is evolved 852·1 c.c. of oxygen, which is in the proportion of 97·2 of oxygen from 100 of carbonic acid; and, that with 744·5 c.c. of oxygen 8·6 c.c. of nitrogen appears, 100 of oxygen being accompanied by 1·11 of nitrogen.

It appears therefore that the liberation of nitrogen during the decomposition of carbonic acid by leaves does not take place to anything like the extent previously indicated; nevertheless, to a slight extent, its production seems to be constant. Fortunately, however, M. Boussingault was induced to submit this nitrogen, which remains after the carbonic acid and oxygen have been removed by potash and pyrogallic acid to a more careful scrutiny, when he was abundantly rewarded by finding that it contained *a portion of a combustible gas*. Analysis indicated that this gas consisted of *carbonic oxide* with a trace of some carburetted hydrogen. In order however to make out its nature satisfactorily, it was necessary to get rid as far as possible of the nitrogen derived from the air originally present in the water, etc. It was also important to ascertain whether the leaves still attached to the living plant furnished the same products. The extreme branches of several trees were therefore passed up into glass receivers under water impregnated with carbonic acid. The *Pinus maritima*, the willow, and the lilac were thus operated upon. Several aquatic anemones were thus introduced into receivers, with the exception of their roots, and performed their functions as naturally as if growing in their native rivers. Each apparatus placed in the sun soon gave abundance of gas, which was collected in successive portions in small flasks. The gas became richer in oxygen as the process continued, the nitrogen in the water being expelled in the first portions. Subsequent analysis also showed that it became richer in combustible gas. The gas obtained in each flask was treated first with potash to remove the carbonic acid, and afterwards by pyrogallate to absorb the oxygen. The residual nitrogen was submitted to analysis. Taking the experiment with the *Pinus maritima* as an example, the centesimal composition of the gas collected was as follows:—

	From 4th flask.	3rd.	2nd.	1st.
Carbonic oxide.....	26·44	16·87	16·89	7·82
Protocarbide of Hydrogen ...	0·74	0·07	0·06	0·33
Nitrogen	72·82	83·06	83·05	91·85
	100·00	100·00	100·00	100·00

Similar results were obtained with every plant operated on.

Having thus then accurately determined the nature of the combustible gas accompanying the oxygen evolved from leaves during the decomposition of carbonic acid, it became important to ascertain whether this formation of carbonic oxide was sufficient to account for the apparent slight increase in the nitrogen obtained in the previous experiments. Further analysis showed that this was the case, and that therefore in the table already given, the column headed "Nitrogen appeared" should really stand "Carbonic oxide formed." One example will be sufficient. In the case of the Oleander,—

The nitrogen obtained after exposure was	10·11 c.c.
The nitrogen obtained before exposure	9·78
Increase by exposure.....	0·33

The analysis of the 10·11 c.c. of gas gave 0·38 c.c. of combustible gas. From the 9·78 c.c. extracted before exposure of course nothing of the kind was obtained. The increase of 0·33 c.c. was thus fully accounted for: it consisted of carbonic oxide. Similar results were obtained in all the other cases. It results, therefore, that during the decomposition of carbonic acid by leaves, *no nitrogen is emitted, but that the oxygen is accompanied by oxide of carbon and carburetted hydrogen*, the combustible gases being produced in the proportion of 1·11 c.c. to every 100 c.c. of oxygen. Light appears indispensable to the development of these combustible gases. If the apparatus filled with leaves be placed in strong sunlight, but covered with a black cloth, until the water attains a

temperature of 38°, the gas collected contains no trace of carbonic oxide or carburetted hydrogen. To keep, then, the expression of these results strictly within the conditions of the experiments, it may be stated that these combustible gases constantly accompany the oxygen which is evolved from a plant under the influence of solar light when immersed in water impregnated with carbonic acid.

M. Boussingault concludes his memoir by asking: "Is it not curious that after the lapse of a century it should be established before this Academy that probably the leaves of all plants, and very certainly the leaves of aquatic plants, in emitting oxygen which ameliorates the atmosphere, also emit one of the most deleterious gases known—oxide of carbon? Is it not permitted to anticipate in the emanation of this pernicious gas one of the causes of the unhealthiness of marshy countries?"

ON SOME COLOURED REACTIONS OF PHENOL (CARBOLIC ACID).

BY M. MONNET.

M. Bertholet has published a note on the blue colouring matter, obtained in great quantity, by acting on phenate of ammonia by Hypochlorite of Lime. M. Béchamp has concluded that aniline only furnishes the blue colour when it contains phenol. This however is, according to M. Monnet, incorrect. A mixture of solutions of sulphate of aniline and hypochlorite of lime produces a blue colour, and on immersing a skein of silk it is at once dyed blue. But this colour is extremely transient, altering in the air to violet, and then brown. If the silk thus dyed be immediately dried and then digested in benzine, nothing is dissolved by the hydrocarbon. If previously, however, the dyed skein of silk be exposed to the air for several hours, it acquires a pale violet tinge; benzine then removes from it a large portion of brown matter, and a rich pure violet remains fixed on the silk. The experiments of M. Monnet were principally made with the sulpho-phenic acid $C_{12}H_6O_2$, $2IO_3$, easily prepared by the action of oil of vitriol on phenol.

On pouring a few drops of perchloride of iron into a weak solution of sulpho-phenic acid, according to Gerhardt, a solution is obtained of a magnificent violet, but it has been found impossible to obtain it sufficiently pure and concentrated for dyeing purposes.

The prolonged action of binoxide of nitrogen in the cold on sulpho-phenic acid gives rise according to the degree of concentration to red, violet, and blue colours. But contrary to the other reactions of phenol, these colours remain only in contact with strong acids, and have but little affinity for tissues. Water converts them to a yellowish opaline solution, and by the addition of ammonia, a liquid is obtained of a green colour, more or less bluish, but always very beautiful.

Iodide of amyle has a curious action on sulpho-phenic acid. The two liquids are mixed in the proportion of fifteen grammes of the former and twenty-five grammes of the latter; there is no reaction in the cold, they even mix but imperfectly, but when heated to 130° cent., abundant vapours of iodine are disengaged; these are driven off by prolonged ebullition, and a syrupy mass remains, of an orange yellow colour, which becomes bright yellow in contact with acids.

By diluted alkalies an abundance of fine red colouring matter is developed, resembling aniline red; acids reduce it again to yellow. This body presents considerable analogy with rosolic acid.—*Répertoire de Chimie.*

THE PRODUCTS OF DECOMPOSITION OF THE RESIN OF GUAIACUM.

BY MM. HLASIWETZ AND DE GILM.

Guairetinic Acid, $C_{40}H_{26}O_8$. The process preferred by M. Hlasiwetz for the preparation of this acid, consists in boiling the purified guaiacum resin with milk of lime for half an hour, filtering, drying the residue, and exhausting it with hot alcohol. This furnishes a yellow tincture, which becomes green on exposure to the air, a change that may be prevented by preserving it in an atmosphere of carbonic

acid. After having separated the alcohol by distillation, the residuum is treated with a hot solution of caustic soda of 1·3 sp. gr. When the mixture cools, the soda salt of the new acid separates in a mass of crystals; these are purified by expression, washing with solution of caustic soda, and recrystallization from water. By treating the crystals with hydrochloric acid, the organic acid is separated; it is purified by crystallization from acetic acid, which dissolves it abundantly whilst hot. It crystallizes more difficultly from alcohol, but in both cases it separates in needles concentrically grouped; the crystals are brittle and inodorous when deposited from an acetic acid solution, but soft, flexible, and with a slight odour of vanilla when crystallized from alcohol. Guairetinic acid is insoluble in water, and is precipitated from an alcoholic solution by its addition. When pure it is not coloured green on exposure to the air; it is turned green, and not blue, by perchloride of iron in alcholic solution; and is not coloured by chlorine water.

The crystals fuse between 75° and 80° cent. The solidification is instantaneous. Heated below the fusing point, the crystals are transformed into a resinous mass. Heated on platinum foil, they burn with a smoky flame.

The acid forms neutral and acid salts, the former alone are crystallizable; it is difficult however to obtain them definite, for the neutral and acid salts crystallize together with facility, the former even decompose on boiling to furnish the acid salts. They all contain water of crystallization.

The guairetinates of the alkaline earths are white amorphous powders. The silver-salt turns brown on exposure to the light, and is quickly reduced by ebullition.

Brominated acid, $C_{42}H_{22}Br_4O_8$. On pouring bromine drop by drop into a solution of guairetinic acid in bisulphide of carbon, the liquid assumes first a carmine red colour, changing to violet, and finally brown. The solution is evaporated on the water bath, torrents of hydrobromic acid are given off, and a crystalline residue is obtained; this is washed with cold alcohol, and then dissolved in boiling alcohol.

Chlorine acts in nearly the same manner as bromine, but the chlorine derivative is less easily purified. Oil of vitriol dissolves guairetinic acid with a red colour. Nitric acid attacks it with great energy, converting it into a resinous mass. Strongly heated, the acid volatilizes in part; heated gently it furnishes guaiacol (gaïacol), from which pyroguaiacine is obtained by exposure to cold.

Pyroguaiacine (pyroguaiacine $C_{19}H_{22}O_6$). This is a feeble acid, forming, with potash and soda, salts crystallizing in needles, which become deep green when heated. The acid is precipitated by nitrate of silver; the precipitate rapidly blackens.

With hot sulphuric acid, pyroguaiacine produces a series of colours; treated with water, the solution deposits a blue powder. An analogous result is obtained by treating pyroguaiacic acid with peroxide of manganese and chromic acid.

Chlorine colours this substance red; perchloride of iron, green. As artificial colouring matters are much sought for, some of these reactions may possibly be made available; it is probable also that they may bear some relation to the colours furnished by tincture of guaiacum under the influence of certain oxidizing agents.—*Journ. de Pharm.*

DETECTION OF COLZA OIL WHEN MIXED WITH OTHER OILS.

BY M. SCHNEIDER.

Colza oil, when used as an adulteration in other more expensive oils, may be readily detected, by its deportment with nitrate of silver, a re-agent which is without action on almond, olive, and other fixed oils. The test is applied in the following manner:—

The oil to be examined is mixed with twice its volume of ether, and about thirty drops of a concentrated alcoholic solution of nitrate of silver added; the mixture is well agitated, and then allowed to subside in the dark; if colza oil be present in large quantity, the lower layer of liquid becomes coloured, first brown and then black; if a small proportion only be present, the brown colour does not appear for some hours,

twelve hours for instance, but in all cases the coloration is evident after the evaporation of the ether.

The author supposed this coloration to be due to the presence of sulphur in colza oil, the oil being derived from a plant belonging to the Nat. Ord. Cruciferæ. Experiment on the oil of mustard has however convinced him that his opinion is unfounded, as this oil gives no colouration with nitrate of silver.—*Journ. de Pharm.*

ON COTTON OIL CAKE.

BY F. GRACE CALVERT, F.R.S.

Not having been able to find in any of our standard chemical works any analysis of cotton oil cake, I beg to lay before your readers the following analysis of one which I have just made:—

Albuminous matter		25·34
Oil		8·46
Sugar and gum		7·71
Starch		10·73
Woody fibre		27·80
Mineral matters, soluble	1·98	8·14
Mineral matters, insoluble	6·24	
Water and loss		11·82
		100·00

From these figures, it will be seen that the composition of cotton oil cake closely resembles that of linseed, rape, and other oil cakes which have been used by agriculturists for a long period. I do not think it necessary to detail the methods followed for separating the constituents of this cake, as your readers will doubtless be familiar with them.

DEATHS FROM CARBONIC ACID GAS.

At Market Harborough, a young labourer and his wife, after supping together retired to rest at 10 o'clock, taking upstairs with them a shovelful of live cinders and coals, which they placed on the hearth of their bedroom under an open chimney. About eleven o'clock groans and unusual noises were heard by persons at the adjoining cottage. An alarm was raised, and after some delay, occasioned by various attempts to attract the attention of the couple within, an entrance into the cottage was effected. The woman was found lying, already dead, upon the bed, while the man lay quite insensible on the floor, but by the admission of fresh air into the apartment he regained his consciousness. It appeared from the evidence of the man that he and his wife awoke nearly simultaneously, the latter feeling sick; he then struck a light, and shortly afterwards felt ill himself; he then lay down on the bed and become insensible. It was proved that the chimney of the bed-room, which was very small, had a downward instead of an upward current of air.

A similar occurrence took place at Cardiff, resulting in the death of four persons. On Monday, February 10th, a man named Patrick Connell, residing in a back house in Ellen Street, New-town, Cardiff, together with his wife and two children, were found dead in their beds. It appears that on Sunday night, the weather being exceedingly cold, and there being no fireplace in their sleeping apartment, they kindled a quantity of coal in a tin pitcher, which they placed in the room before they went to bed. On Monday morning they were discovered dead in their bed by some of the neighbours, and medical aid was procured, but no sign of life was apparent in either case. The man was 40 years old, and his wife 25 years, the daughter 2½ years, and an infant boy only 10 days old. An inquest was held on Monday evening, before Mr. R. L. Reece,

the coroner of the county, and a verdict of "Died by suffocation by inhaling carbonic acid gas" was returned.

At the chemical works of Messrs. Hugh, Lee, Patterson and Co., of Newcastle, several men narrowly escaped suffocation from carbonic acid gas. The men were employed in cleaning out a pit wherein chalk, after undergoing the action of hydrochloric acid, leaves a flinty deposit. The pit which is twenty feet deep is entered by a hole at the top about two feet in diameter. The men had incautiously entered when there was a considerable quantity of carbonic acid gas floating in the pit, and had become unconscious when they were discovered by another workman, who raised an alarm and the men were speedily removed. A surgeon was sent for and the men were fortunately restored to consciousness.

METHYLATED SPIRIT FOR TINCTURES.

The following correspondence on the use of methylated spirit for tinctures has appeared in the 'Dublin Medical Press' for January 22:—

"11, Upper Merrion Street, 4th Jan., 1862.

"Dear Sir,—I enclose an official reply to your letter of the 7th December, and also a copy of a report of the committee adopted by the College on the 27th January, 1858, a copy of which report was forwarded at the time to the Board of Inland Revenue. You are at liberty to make any use you think right of these documents.—I am, dear Sir, your obedient servant,

"Lombe Atthill, M.D.,
"Fellow and Registrar.

"Dr. Armstrong."

"King and Queen's College of Physicians in Ireland,
"Dublin, January, 1862.

"Sir,—In reply to your letter of the 7th December, 1861, I am directed to inform you that the proclamation of the Lord Lieutenant and Privy Council of Ireland, of the 22nd August, 1850, states most clearly what the law is—viz. that all apothecaries, chemists, and druggists in Ireland are bound to make and compound medicines according to the Pharmacopœia of the King and Queen's College of Physicians in Ireland, and that any apothecaries, chemists, and druggists, not making and compounding medicines according to the Pharmacopœia, are acting illegally and are liable to prosecution; and said order of Lord Lieutenant and Council further expresses the determination of the Crown to prosecute all offenders. This order of Lord Lieutenant and Council is so explicit that the College deem no comment necessary. The order referred to will be found in the Pharmacopœia of the King and Queen's College of Physicians in Ireland, 1850. Compliance with the formulæ of the Pharmacopœia, as to the strength and compounding of medicine, is obviously most necessary for the safety of the public, for if any apothecary or chemist made or compounded medicine other than in compliance with such formulæ, medicines prescribed by physicians or surgeons might at one time be inert, or nearly so, and at another so active as to become poisonous. In conclusion, I would call your attention to the power given by Act 1 Geo. III., chap. 14, sec. 15, to the chief magistrate or any two justices to inspect, seize, and destroy all drugs defective or otherwise unlawful.—I am, Sir, your obedient servant,

"Lombe Atthill, M.D.,
Fellow and Registrar.

"To the Hon. Secretary of the
Cork Medical Protective Association."

COPY.

King and Queen's College of Physicians in Ireland,
Dublin, January, 1862.

Report adopted 26th January, 1858.

The committee appointed to take into consideration the correspondence of the Board of Inland Revenue with the Colleges of Physicians of London and Edinburgh and with this College relative to the use of methylated spirit, for pharmaceutical purposes,

beg to report, that having fully considered the subject, they are unanimously of opinion that it would be improper as well as illegal to sanction the use of this spirit as a substitute for other menstrua employed in any of the processes prescribed in the Pharmacopœia,—a substitute which, through the cupidity of manufacturing chemists, might have the effect of lowering the standard of purity of some of our most important medicines. With reference to the supposed benefits likely to accrue to medical science by the employment of spirit instead of water in the manufacture of extracts, the committee would observe, that spirit being a much less general solvent of the active principles of drugs than water, the advantages which such substitution offers are on scientific principles very questionable, and are certainly not sufficient to induce the committee to recommend any alteration of the law as it at present exists, which would have the effect of facilitating the use of methylated spirit for such purpose.

(Signed) Lombe Atthill.

At the last meeting of the County and City of Cork Medical Association, the following resolution, with reference to the subject of the above correspondence, was proposed by Dr. Townsend, seconded by Dr. Beamish, and unanimously resolved:—"That we feel it incumbent on us to record our decided conviction, that any departure from the formularies of the Pharmacopœia in the preparation of compound medicines, is unjust and injurious to the public and the medical profession; and we deem the supply of *medicines of pure quality* to the institutions set apart for the medical treatment of the poor of as much importance as those furnished to private patients."

"That this resolution be forwarded to the Royal College of Physicians, with a respectful request that they record their opinion on this most important subject, and either by advertisement or otherwise, call on the apothecaries of Ireland to make their several preparations according to the Pharmacopœias, in default of which they become liable to a severe penalty."

(Signed) Joshua R. Harvey, M.D., President.
Charles Armstrong, M.D., Hon. Sec.

TASTELESS PILLS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Gentlemen,—In the present February Number of the Pharmaceutical Journal there is a letter from Mr. R. C. Furley, on my process for rendering pills tasteless, which process, he says, is a failure; or, as he elegantly expresses it, "a method of coating pills, that I, many months ago, not only found not to answer the purpose of making pills tasteless, but of making them useless," *that is not useless.*

I think it will be evident to every sensible man having any acquaintance with the properties of tragacanth, that if a pill be moistened with any solution capable of exerting a solvent (or softening) action upon the tragacanth, it must render the coating liable to crack by the contraction in drying, unless certain precautions are taken which I mentioned in my paper. If a spirituous solution capable of producing an adhesive surface be employed, no solvent action is exerted, and consequently it is impossible for the tragacanth covering to crack.

I forwarded some pills and materials to Professor Redwood to exhibit at the meeting of the Pharmaceutical Society on the evening of the 5th, and I have no doubt they quite satisfied that meeting as to the value of the process. Some of the pills forwarded were coated in November last.

Mr. Furley further states that he has the power to prohibit me from using tragacanth for the purpose of covering pills. I beg to inform him that I have coated pills with solution of tolu and tragacanth for more than twelve months, and that in April and May last year, I supplied a public institution here with upwards of twenty gross of pills coated in this way, the physicians and surgeons of which institution are willing to bear testimony of the fact.

I am informed, that instead of Mr. Furley being able to prohibit my using tragacanth, the fact of my employing it before the date of his depositing his specification (October 12th, 1861,) renders his patent null as far as tragacanth is concerned.

I am, Gentlemen, yours very respectfully,

Hardman Street, Liverpool,
February 21, 1862.

SAMUEL BANNER.

BOOKS RECEIVED.

THE HALF-YEARLY ABSTRACT OF THE MEDICAL SCIENCES. Edited by W. H. Ranking, M.D., etc., and C. B. Radcliffe, M.D., etc. Vol. XXXIV., July—December, 1861. London: John Churchill, New Burlington Street.

ON THE USE OF CHLORATE OF POTASS IN THE TREATMENT OF CONSUMPTION AND SCROFULA. By Alexander Haskin, M.D., etc. (From the Author.)

TO CORRESPONDENTS.

Wanted.—The following back numbers of the 'Pharmaceutical Journal:'—Nos. 6, 11 and 12 of Vol. XI.; Nos. 1 and 2 of Vol. XII.; and No. 6 of Vol. I. (Second Series). Eightpence per copy, for any of the above numbers, will be paid, on delivery at 17, Bloomsbury Square.

Tasteless Pills.—An Assistant (Edinburgh) recommends the following, as an improvement on the Albumen and Tragacanth process for coating pills:—

"Dissolve ʒij of clean gutta-percha in ℥j of methylated chloroform. A portion according to the number of pills to be coated is placed in a covered pot, the pills added, rapidly shaken round and thrown out upon a slab." [We think the solubility of the pills would be greatly impaired by such a process.]

S. H.—(1) Phosphorus may be obtained in a state of fine division by agitation in spirit; having first dissolved the phosphorus by the aid of gentle heat. (2) *Subcarbonate of Bismuth.* The dose is from 5 to 15 grains. (3) By rendering the oxidation of the silver more complete.

G. J. (Birmingham).—Will see that his request has been complied with.

Lindley.—See 'Pharmaceutical Journal,' Vol. II. (Second Series), p. 495; and p. 182 of the present volume.

L. B.—Crystals of sulphate of potash saturated with aromatic vinegar.

Chemist (Commercial Road East).—Yes; provided a license for selling patent medicines has been obtained, and a stamp be affixed to each powder.

A Member wishes for a formula for *Essence* of Sumbul: a formula for the tincture will be found in this Journal, Volume XV., page 508.

K. K. (Nottingham).—*Syrupus Ferri et Quinæ Hypophosphitis.* In the absence of any recognized formula, we give the following:—Take Quinæ Disulph. gr. 64; Acid Sulph. Dil. m. 64; water and ammonia, q. s.; Ferri Sulph. gr. 185; Sodæ Bicarb. gr. 240; water, q. s.; Acid Hypophosph. ℥iiiss; water, q. s. ad ℥viij; sugar ℥xij. The precipitated Quina and the carbonate of iron are first to be washed, and then dissolved in the hypophosphorous acid and the sugar added.

R. P. O.—See Vol. II. (Second Series), p. 441.

An Old Member (Bishop's Stortford).—The subject will receive attention.

Oxoniensis.—There is none.

H. B. (Winchester).—We know of no analysis of the water referred to.

G. B. M.—We recommend *Selecta è Prescriptis* and a Latin Dictionary.

Instructions from Members and Associates respecting the transmission of the Journal, before the 25th of the month, to the Secretary, ELIAS BREMRIDGE, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. CHURCHILL, New Burlington Street. Other communications to the Editors, 17, Bloomsbury Square.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. III.—No. X.—APRIL 1st, 1862.

PHARMACEUTICAL RESPONSIBILITY *versus* FREE TRADE IN PHYSIC.

It is well known to the readers of this Journal, and it ought to be more generally known and distinctly avowed by the medical profession and the public at large, that for more than twenty years a considerable and very influential section of the chemists and druggists of this country have been making strenuous exertions for promoting the attainment of a high degree of professional qualification by those who are engaged in the practice of pharmacy. Among the successful results of these exertions have been the establishment of the Pharmaceutical Society, with ample means for extending pharmaceutical education, and the enactment of a law recognizing the beneficial tendency of the objects of this Society, and securing to its members and those similarly qualified, the exclusive use of the title of Pharmaceutist or Pharmaceutical Chemist. On the other hand, among the unsuccessful results of the exertions made, has been the failure to induce all or even a majority of existing Chemists and Druggists to co-operate in carrying out the proposed object, or even to recognize the necessity or importance of requiring from those who deal in dangerous medicines or poisonous substances that they should prove by the test of examination that they are qualified for such a responsible duty.

The body of Chemists and Druggists has thus become divided into two classes, consisting of, firstly, those who are legally recognized as qualified Pharmaceutical Chemists; and secondly, those who have no such recognition or legal qualification. Those of the second class still call themselves Chemists and Druggists, while the former have generally adopted their distinctive title of Pharmaceutical Chemist.

It was very natural that the Chemists and Druggists who, after repeated solicitations, have persisted in refusing to join in acknowledging the necessity for a test of qualification, should be anxious to justify their separation from the class of qualified men; but it is much to be regretted that in doing this any ill-advised members of their class should advocate the doctrine of free-trade in physic. If this means anything, it means that any man, however ignorant, is justified in carrying on the business of a Chemist and Druggist, supplying the public with dangerous substances the properties of which he may be unacquainted with, and dispensing medicines for the sick.

The doctrine of free-trade in physic, and the advocacy of unrestrained liberty to supply the public with dangerous drugs and poisons, have not, that

we are aware of, been adopted by the Pharmaceutical Society, and we trust they never will be; on the contrary, the efforts of this Society have frequently been directed in an opposite direction.

We feel assured also that this doctrine will not receive the sanction of the Legislature or of that portion of the public comprising those who have well considered what the influence of its adoption would be upon the practice and the science of medicine, and both directly and indirectly upon the public health.

The evils of free trade in physic and poisons have frequently been referred to in this Journal, and also in the medical and public journals. The responsible nature of the duties of the chemist and druggist cannot be denied, and the necessity for a thorough practical and scientific qualification for these duties is every day receiving a more general recognition among all classes.

Even now the Government require that all those who are employed in dispensing medicines for the army shall have proved their qualification by an examination before the Board of Examiners of the Pharmaceutical Society. Others may be equally qualified, but until they have submitted themselves to the test of examination, their light is hidden beneath a bushel, and they are not therefore entrusted with the responsible duty of administering powerful agents upon the action of which the life or death of so many human beings is daily depending.

APPOINTMENT OF LOCAL SECRETARIES.

In the number of this Journal for last August it was stated that the Council had adopted the following new regulations for the appointment of Local Secretaries in the country:—

"1. That in the opinion of this Council it is desirable that the election of Local Secretaries should be vested in the hands of local members, subject to the approval of the Council.

"2. That in accordance with this view, the present Local Secretaries in connection with the Pharmaceutical Society will bear in mind that their term of office expires simultaneously with the members of the Council, in May, 1862, and thence after that, they shall be elected annually in their respective localities by the local members, summoned by the outgoing Secretary for that purpose; but should there be, from any cause, an omission to fill up the appointment, it shall be expedient, at the suggestion of a local member, with the consent of the Council, to take the necessary steps to supply the omission."

The Local Secretaries are now requested, in accordance with the foregoing resolutions, to send to the Secretary in London, for approval by the Council, the names of the persons appointed in the several districts as Local Secretaries for the ensuing year.

THE NEW BYE-LAWS.

The attention of members is directed to a notice on the cover of this number of the Journal, convening a SPECIAL GENERAL MEETING of the members of the Pharmaceutical Society for the purpose of approving and confirming some additions and alterations in the Bye-laws which were passed on the 15th of January last. It will be recollected that at the meeting referred to, the Council pledged themselves to make some further alteration that was then suggested, and the meeting now summoned is for the consideration of this and one or two other proposed alterations.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

FINANCIAL STATEMENT—*From 1st January, to 31st December*, 1861.

Receipts.	£	s.	d.
Balance in Treasurer's hands	1045	18	4
Life Member's Fund:			
Fees 115 10 0			
Interest 55 6 2			
	170	16	2
Benevolent Fund:			
Subscriptions 50 19 6			
Interest 157 8 10			
	208	8	4
Government Securities:			
Proceeds of Sale of £1643 0 2 Stock 1490 1 0			
Interest 43 3 9			
	1533	4	9
Rent 83 10 0			
Return on Assessed Taxes 17 7 11			
	100	17	11
Fees:			
45 Pharmaceutical Chemists 236 5 0			
57 Assistants 238 7 0			
55 Apprentices 115 10 0			
	590	2	0
Subscriptions:			
351 London Members 368 11 0			
1492 Country Members 1566 12 0			
120 Associates 63 0 0			
51 Apprentices 26 15 6			
	2024	18	6
Arrears of Subscription	53	0	6
Lecture Fees	82	19	0
	£580	5	6

Expenditure.	£	s.	d.
Benevolent Fund:			
Gratuities	55	0	0
Conversazione 73 7 9			
Pharmaceutical Meetings 5 3 7½			
Inventory of Furniture, Apparatus, etc. 3 3 0			
Repayments of Subscriptions received in excess 7 17 6			
	89	11	10½
House Expenses	63	12	5
Rent, Rates, Taxes, and Insurance	497	9	5
Alterations and Repairs	125	15	4
Fixtures and Fittings	183	8	7
Apparatus	104	17	10
Library	43	1	7
Museum, including New Cases	131	6	8
Furniture	58	7	5
Stationery	12	19	9
Postage	53	19	4
Printing and Engraving	70	2	3
Advertisements	15	0	0
Journals, postage of, etc.	608	12	3½
Carriage	4	12	8
Collector's Commission	25	3	0
Travelling Expenses	116	9	8
Salary to Secretary	250	0	0
Wages	169	14	0
Compensation to Tenant	10	0	0
Expenses of Society in Scotland	64	2	8
Board of Examiners	82	19	0
Professor of Chemistry and Pharmacy, including duties as Curator in his department, and payment of Assistant	300	0	0
Professor of Materia Medica and Botany, including duties as Curator in his department, and payment of Assistant	250	0	0
Subscription to Royal Botanical Gardens	21	0	0
Prize Medals, etc.	9	6	6
Mr. Batterbury, Contractor, for Alterations, etc., £2008 6 1, balance of account; appropriated and apportioned to the following accounts:—			
General Repairs 800 9 0			
Alteration of Lecture Hall (balance) 424 1 2			
Do. Museum do. 104 0 0			
Fixture & Fittings —Laboratory 357 2 7			
Do. Lecture Hall 322 13 4			
	2008	6	1
Architects' charges, balance of their account	221	13	0
Repayment to Secretary, Petty Cash	4	0	8
Balance in Secretary's hands	2	1	11
Balance in Treasurer's hands	157	11	7
	£5810	5	6

We, the undersigned Auditors, have examined the Accounts of the Pharmaceutical Society, and find them correct agreeably with the foregoing state-

ment, and that, as shown by the Books of the Society, there was standing in the names of the Trustees of the Society, at the Bank of England, on the 31st of December, 1861:—

On Account of the General Fund, New 3 per Cents. ...	£1000	0	0
Benevolent Fund, 3 per Cent. Consols	5573	16	0
Life Members' Fund, 3 per Cent. Consols	1998	10	4

At that date there was due to the

Benevolent Fund.....	£113	8	4
Life Members' Fund	115	10	0

28*th February*, 1862.

EDWARD CONSTANCE,
JOHN CARR,
ARTHUR BOWDLER HILL, } *Auditors.*

SUBSCRIBERS TO THE BENEVOLENT FUND, 1861.

	£	*s.*	*d.*
Allchin, Alfred, Coles Terrace	0	10	6
Arnold, Edward, Norwich.....	0	5	0
Attwood, George, Brompton, Kent	1	1	0
Attwood and Hugill, Messrs., 61, Cannon Street	1	1	0
Balmer, J., 94, St. John St. Rd.	1	1	0
Barnard, John, 338, Oxford St.	0	10	0
Barron, William, Cheltenham	0	2	6
Best, John D., 28, Suffolk Street, Pall Mall.....	1	1	0
Bevan, Charles F., Harwich...	0	10	6
Bird, W. L., 42, Castle Street, Oxford Street.....	0	10	6
Blake, Sandford, and Blake, 47, Piccadilly	1	1	0
Bolton, Thos., Tenterden	0	5	0
Bond, John, Yarmouth.....	0	5	0
Bottle, Alexander, Dover	1	1	0
Butcher, Thomas, Cheltenham	0	2	6
Bourdas, Isaiah, 10, Pont Street	0	10	6
Boyce, John Pierce, Chertsey	0	5	0
Brailey, Charles B., Heavitree	0	5	0
Carr, Wm. Graham, Berwick	0	5	0
Cartwright, Wm., Newcastle-under-Lyne.....	0	10	6
Christopher, Wm., Crickhowell	0	5	0
Coles, J., New Rd., Camberwell	0	10	6
Cooper, George, Exeter.....	0	5	0
Cupiss, Fras., Diss.....	0	10	6
Daines, Thos., 338, Oxford St.	0	10	6
Darby & Gosden, 140, Leadenhall Street	2	2	0
Davies, Charles, 11, Claremont Place, N. Brixton	0	5	0
Davies, Henry E., 43, Wood Street, City.....	0	10	6
Deane, Henry, Clapham	1	1	0
Eddy, Charles William, 30, Crown Street. Finsbury.....	1	1	0
Evans, John H., 60, Bartholomew Close	1	1	0
Fauleoner, Robert, Keen's Row, Walworth	1	1	0
Fletcher, Francis, Cheltenham	0	2	6
Fox, William, 48, Church St., Bethnal Green	0	10	6
Gale, Samuel, 338, Oxford St.	0	10	6
Gedge, Wm. S., 77, St. John St.	0	5	0
Goodbarne, Thomas, 13, Charles Place, Hoxton	0	10	6
Goodwin, John, Lower Clapton	0	10	6
Gristock, Thomas, 42, South St. Manchester Square	0	10	6
Haselden & Fisher, 18, Conduit Street	1	1	0
Hills, Thomas H., 338, Oxford Street	1	1	0
Hollier, Elliot, Dudley.....	0	10	6
Hooper, Bartlett, 43, King William Street	2	2	0
Hudson, W. B., 27, Haymarket	1	1	0
Hurst, Wm. T. H., Hempstead	0	5	0
Husband, Matthew, Exeter ...	0	5	0
Inee, Joseph, 31, Southampton Street	0	10	6
Jackson, Thos., Manchester...	0	10	6
Knight, John, Cambridge.....	0	10	6
Leseher, Joseph S., 60, Bartholomew Close	1	1	0
Meggeson, George, Wandsworth	0	10	6
Middleton, F., 338, Oxford St.	0	10	6
Moore, James Lodge, 1, Craven Street, Westbourne Terrace	0	10	6
Nind, George, Wandsworth ...	0	10	6
Noakes, Richard, Brighton ...	0	10	6

	£	s.	d.
Otter, William, Bloxham	0	5	0
Palk, John, Exeter	0	5	0
Palmer, Faithful, Cheltenham	0	2	6
Penrose, Arthur W., 7, Amwell Street, Clerkenwell	0	5	0
Pocklington, James, Sydenham	0	10	6
Pollock, T., 129, Fenchurch St.	1	1	0
Powell, John, Shaftesbury	1	1	0
Pratt, John, Chichester	0	10	6
Prockter, Richard E., Cheltenham	0	2	6
Proctor, William, Newcastle	1	1	0
Rankin, William, Kilmarnock	1	1	0
Rastrick, Joseph L., Southsea	0	5	0
Rea, Edward, 115, Wardour St.	1	1	0
Rea, James P., 115, Wardour St.	0	5	0
Redfern, J., Ashby-de-la-Zouch	1	1	0
Robinson, James Mowld, Beverley	0	5	0
Shirley, John George, 1, Westbourne Grove, Bayswater	0	10	6
Sims, John F., Hemingford Place, Barnsbury	0	5	0
Smith, Nathaniel, Cheltenham	0	2	6
Smith, Wm. Frederick, Keen's Row, Walworth	0	10	6
Spencer, Charles, Gravesend	1	1	0
Starkie, James, 4, Strand	1	1	0
Stone, John, Exeter	0	5	0
Tanner, Nicholas W., Exeter	0	5	0
Thompson, John, Liverpool	0	5	0
Tucker, Charles, Bridport	0	10	6
Waite, Joseph, Cheltenham	0	2	6
Warner & Barclay, Fore Street, City	1	1	0
Watlock, John D., Wandsworth	0	10	0
White, Daniel, Park Terrace, Regent's Park	1	1	0

AT A MEETING OF THE COUNCIL, 5*th March*, 1862,

Present—Messrs. Bottle, Brady, Bucklee, Davenport, Deane, Hanbury, Herring, Hills, Lescher, Mackay, Meggeson, Morson, Sandford, Savage, Squire, and Waugh,—the following were elected

MEMBERS.

BOGNOR .....Long, Alfred Thorby.
LEEDS .....Smeeton, George Henry.
LONDON .....Applegate, Edwin.
LONDON .....Humphreys, Richard.

BOTANICAL PRIZE FOR 1863.

A SILVER COUNCIL MEDAL

Is offered for the best Herbarium, collected in any part of the United Kingdom, between the first day of May, 1862, and the first day of July, 1863; and, should there be more than one collection possessing such an amount of merit as to entitle the collectors to reward, a second prize, consisting of a Bronze Medal, and also Certificates of Merit, will be given at the discretion of the Council. In the event of none of the collections possessing such an amount of merit as to warrant the Council in awarding Medals or Certificates, none will be given.

The collections to consist of Phanerogamous plants and Ferns, arranged according to the Natural System of De Candolle, or any other natural method in common use, and to be accompanied by lists, arranged according to the same method, with the species numbered.

The collector to follow some work on British Botany (such as that of Babington, Bentham, or Hooker and Arnott), and to state the work which he adopts. The name of each plant, its habitat, and the date of collection, to be stated on the paper on which it is preserved.

Each collection to be accompanied by a note, containing a declaration, signed by the collector, and certified by his employer, or a Pharmaceutical Chemist known to the collector, to the following effect:—The plants which accompany this note were collected by myself, between the first day of May, 1862, and the first day of July, 1863, and were named and arranged without any assistance but that derived from books.

In estimating the merits of the collections, not only will the number of species be taken into account, but also their rarity or otherwise, and the manner in which they are preserved; and should a specimen be wrongly named, this will at once be erased from the list.

The collections to be forwarded to the Secretary of the Society, 17, Bloomsbury Square, on or before the first day of August, 1863, endorsed "Herbarium for Competition for the Botanical Prizes."

If required, the collections will be returned after competition.

No candidate will be allowed to compete unless he be an Associate, Registered Apprentice, or Student of the Society, or if his age exceed twenty-one years.

FREE ADMISSIONS TO THE ROYAL BOTANIC SOCIETY'S GARDENS, REGENT'S PARK.

The following pupils of the Class of Materia Medica and Botany at the Pharmaceutical Society, after examination in the Elements of Structural and Physiological Botany, by Professor Bentley, have had free admissions for six months to the Royal Botanic Society's Gardens, in the Regent's Park, kindly forwarded to them by Mr. Sowerby:—

Mr. Thomas J. Greatrex
— Alfred Hodder
— Walter Holgate
— E. H. Jordan
— P. Marrack
— H. J. Pearson
— J. C. Preston
Mr. James Swenden
— W. A. Tilden
— Thomas W. H. Tolbort
— J. Ward
— J. Whitfield
— S. T. Wilsher.

These orders will admit to the gardens upon ordinary days, in the months of March, April, and August, from nine A.M. till one P.M.; and in May, June, and July, from seven A.M. till one P.M. Such orders, therefore, give every facility to those to whom they have been awarded of making themselves practically acquainted with plants.

PHARMACEUTICAL MEETING.

Wednesday, March 5th, 1862.

MR. PETER SQUIRE, PRESIDENT, IN THE CHAIR.

The following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced, and the thanks of the Society given to the respective donors:—

On the Economic Applications of Seaweeds. By Edward C. C. Stanford. From the Author.

The Technologist.
The New York Journal of Materia Medica.
The Dental Review.
The British Journal of Dental Science.
The Répertoire de Chimie.
The Chemical News.
The Chemist and Druggist.
The Educational Times.
The Photographic Journal. From the respective Editors.

Journal of the Chemical Society.
Bulletin de la Société Chimique de Paris.
The Journal of the Society of Arts. From the respective Societies.
The Triennial Handel Festival of 1862. From the Crystal Palace Company.
Proceedings of the Linnæan Society. From the Society.
Specimen of American Rock Oil. From Mr. Robert Palmer.
Specimen of *Juniperus communis* and *Juniperus Sabina.* From Mr. J. Brewer.
Specimen of an Alga from Labrador. From Mr. Peter Squire.
Specimens of Claudet's Ammoniacal Salt of Cobalt. From Mr. J. H. Baldock.
Specimens of Teak Wood with depositions of Phosphate of Lime. From Professor Abel, of Woolwich.
Specimen of Botany Bay Kino, and of "Sea Jelly," sent to this country by Mr. L. Redpath. From Mr. T. Hills.

The following Papers were read:—

ON THE MANUFACTURE OF KELP.

BY EDW. C. C. STANFORD, F.C.S.

The manufacture of kelp, or the burning of seaweed to obtain its ash, was commenced about the middle of the last century, and was first carried on for the value of the carbonate of soda contained in it; but when the high war duties were taken off foreign barilla and salt, kelp, for which the demand had been very great, deteriorated in value and was scarcely worth making. The carbonate of soda is never now extracted from this source; the yield was always small, and it is now obtained so cheaply from common salt. At the beginning of the present century, during the war, Highland kelp realized from £20 to £22 per ton. M'Culloch states that the kelp shores of the island of North Uist alone let for £7000 per annum; that the Hebrides afforded 6000 tons of kelp per annum, and the total produce of Scotland was 20,000 tons per annum, an amount which has never been manufactured since throughout Great Britain. When the duty was taken off barilla, Highland kelp fell to £3 per ton, and very little was produced. In 1812, iodine was discovered by M. Courtois, manufacturer of saltpetre, in Paris. The discovery was announced by M. Desormes, at the meeting of the French Institute on the 19th November, 1813. The attention of the discoverer was first arrested by the destruction of his copper pans employed in the decomposition of nitrate of lime by the alkaline lye of the kelp. Having constantly observed this phenomenon, he attempted its solution, and after much patient research and many failures, he succeeded in tracing the effect to the cause and in preparing iodine in a state of purity. The manufacture of saltpetre having failed, Courtois took to the preparation of iodine as a source of profit, but in consequence of its then very limited application, the enterprise was unsuccessful, and the project was abandoned.

It was taken up afterwards by M. Tissier, at Cherbourg, and this gentleman founded a large factory, which is still in active operation in that neighbourhood. Although, like many inventors, Courtois gained nothing by his discovery, a late distinguished English chemist turned it to good account, and made a large sum of money by buying up all the mother liquors of the Scotch kelp works, and extracting the new body.

Iodine has since been found widely diffused in nature; kelp is however the only commercial source for its production, and the value of this element in photography and medicine, renders the manufacture of kelp an important necessity. As at present carried on, it has many disadvantages; these are well known to chemists, but, probably from the fact that it is conducted on desolate shores, at a considerable distance from centres of civilization, it has not yet received that attention its importance demands.

The manufacture is at present limited to a few parts of Great Britain, the western and northern islands of Scotland, the north-west coast of Ireland, and Guernsey.

In the Scotch islands the weeds are collected in the summer, dried in the sun, and burned in shallow rectangular pits; the fire acquires a very high temperature, and the salts enter into igneous fusion; the fused mass is broken up by throwing water on it, and the kelp thus produced is a vitreous conglomerate, in the best specimens of which the carbonized stems of *Laminaria digitata* may be distinguished. It is of this plant—called *bardarrig* in the "drift weed"—that the most valuable kelp is made; if unadulterated it will yield the lixiviator from ten to fifteen pounds of iodine per ton. The "cut weed" is the *Laminaria saccharina*, called "Slaten-varra," but this is mixed with several Fuci, and generally the latter predominate; the kelp produced from it does not afford more than half the iodine yielded by the former.

The kelp in the north-west of Ireland is made principally from the "drift-weed" consisting of "sea-rods," as the *Laminaria* is there called; it is burnt in small heaps, and at a lower temperature; the kelp produced is consequently more porous, and much richer than that from the western islands. Some of the drift-weed, too, is stacked in the winter for burning in the summer.

A portion of the Irish kelp is made from "cut weed," principally the Fuci.

Professor Graham first directed attention to the seaweed ash of Guernsey as the richest source of iodine; this results from the fact that the *Laminaria digitata* is used, and a very low heat is employed in the production of the ash. Mr. Arnold, of Guernsey, is the only lixiviator of kelp there, and he informed me that the local government had more than once tried to stop the lixiviation altogether, and owing to the peculiar laws of that island he has not yet carried it to any great extent.

I am indebted to Mr. William Paterson, of Glasgow, who alone lixiviates nearly four-fifths of the kelp of commerce, for the following statistics of the actual annual average amounts of kelp paid for, with the prices on the kelp shores. These prices do not include freight and other charges incidental to the carriage of kelp to Glasgow. The average is taken on the last two years.

Western Islands.

1,800	tons	cut weed kelp,	@ £2.....	£3,600
800	,,	drift weed ,,	@ £4.....	3,200
400	,,	,, ,,	@ £6.....	2,400
3,000				£9,200

Orkney and Shetland Islands.

1,200	tons	drift weed kelp,	@ £6.....	£7,200
150	,,	cut weed ,,	@ £2 10s....	375
1,350				£7,575

Ireland.

2,500	tons	of drift weed kelp,	@ £4 ...	£10,000
500	,,	,, ,,	@ £3 10*s.*	1,750
1,000	,,	,, ,,	@ £5 ...	5,000
500	,,	,, ,,	@ £6 ...	3,000
200	,,	,, ,,	@ £6 5*s.*	1,250
80	,,	,, ,,	@ £7 ...	560
1,300	,,	cut weed. ,,	@ £2 13*s.*	3,445
6,080				£25,005

TOTAL AMOUNT OF KELP, AND AVERAGE PRICE FOR THE YEAR 1860–61.

Scotland ...	4,350 tons	@ about £3 17*s.*,	valued at	£16,775
Ireland ...	6,080 ,,	,, £4 2*s.*	,,	25,005
	10,430			£41,780

In round numbers, the average yield of British kelp may be taken at 10,000 tons, giving, at £4 per ton, an annual income of £40,000.

Kelp is also extensively manufactured on the coast of Normandy in France. The weeds obtained are very similar to those of the Channel Islands.

MM. Tissier, *aîné et fils*, are the principal manufacturers of iodine and salts of potash in Bretagne. I have received an important communication from these gentlemen, which furnishes me with valuable statistical information on the kelp manufacture in France. Their statements will astonish those who consider England to be in advance in this branch of industry; their position among the first and largest lixiviators of kelp, and their well-known name, are ample guarantees of their ability to judge, and to speak practically, of this question. They estimate the total annual production of kelp (*soude brute*) in France at 25,000,000 kilogrammes; this is about 24,000 tons, or more than double the yield of the kelp shores of Great Britain. MM. Tissier alone, in their Usine de Conquet, work annually 4,000,000 to 5,000,000 kilogrammes. They have favoured me with the following interesting table of the products annually extracted from this source by the seven principal factories in France :—

USINES.	Iode et Iodure de Potassium.	Brome et Bromure de Potassium.	Chlorure de Sodium.	Chlorure de Potassium.	Sulphate de Potasse.	Nitrate de Potasse.
	kilos.	kilos.	kilos.	kilos.	kilos.	kilos.
Le Conquet . . .	20,000	1,500	800,000	500,000	200,000	200,000
Granville	20,000	800	800,000	...	...	1,000,000
Cherbourg. . . .	5,000	...	200,000	180,000	80,000	...
Montsarac. . . .	4,500	...	160,000	150,000	75,000	...
Pont l'Abbé . . .	4,000	200	150,000	140,000	70,000	...
Portsall	4,000	...	150,000	140,000	65,000	...
Quatrevents . . .	2,500	...	100,000	90,000	50,000	...
	60,000	2,500	2,380,000	1,200,000	540,000	1,200,000

The lixiviation of British kelp is almost confined to Glasgow; a small portion only is worked in Ireland and Guernsey. There are six principal lixiviators: of these, Mr. W. Paterson is by far the largest; he works from 7500 to 8000 tons per annum. His enormous factory is well worthy a visit, and I am glad of an opportunity of acknowledging his attention and courtesy in showing me over it. The process usually followed is sufficiently simple; the kelp is lixiviated with water, and the solution evaporated; the sulphate of potash deposits first in small crystals, and then the chloride of sodium; these are separately collected, and the solution is then run off into iron coolers, where a crop of crystals of chloride of potassium is deposited in three or four days. This process is repeated with the mother liquor, and after the second crop of chloride of potassium has crystallized out, the mother liquor is very dark and contains sulphides; oil of vitriol is added to decompose these, and much sulphur is precipitated; this is one of the bye products of the factory. The liquor, after the addition of the oil of vitriol, is decanted from the deposited sulphur, and distilled with binoxide of manganese in leaden retorts; the iodine sublimes, and is received in earthen vessels.

This is an outline of the process generally adopted; it is simple and effective, but its success is entirely dependent on the preparation of the kelp employed, and it is in the primary treatment of the seaweeds that reform is so much needed.

The disadvantages of the present method of manufacturing kelp are principally the following :—

1st. The high temperature developed in burning, by which much of the iodine is volatilized, and some of the potash; the loss of iodine is equal to the present yield.

2nd. The high temperature also enables the carbon to deoxidize the alkaline sulphates, reducing them to sulphites, hyposulphites, and sulphides. These become concentrated in the mother liquor, remaining after the extraction of the salts, and entail a large expenditure of oil of vitriol for their reconversion into sulphates. Dr. Wallace (in a paper read before the British Association, at Aberdeen, September 14, 1859) estimates the cost of extracting all the salts and the iodine from kelp, at from 25*s*. to 28*s*. per ton, of which from 11*s*. to 13*s*. are expended in oil of vitriol. The importance of this disadvantage is therefore obvious; the addition of the oil of vitriol to the mother liquor sets free large volumes of sulphuretted hydrogen, resulting from the decomposition of these sulphur compounds. To such an extent is this deoxidation carried, that kelp prepared from the *Fuci*, which are rich in sulphates, gives off sulphuretted hydrogen on simple solution in water.

3rd. The crude manner in which the weed is burned in a rough clay pit, or in heaps on the beach, the kelp thus becoming mixed with the clay, sand, or stones, which are sometimes also employed as adulterations to the extent of 50 per cent.

4th. The general neglect of the winter supply, on account of the difficulty of drying the weeds at that season. This consists principally of the deep sea algæ, torn up by storms; it occurs in the greatest quantity, and is also much the richest in iodine and potash. Yet this is almost entirely lost. Even in the summer, during a wet season, large quantities of drift weed collected by the kelpers are rotted by the rain, and rendered useless for burning; and this, says Mr. Paterson, "was the fate of many thousands of tons during the last kelp season."

5th. The entire loss of the heat produced, and the products of combustion.

6th. The dense smoke and unpleasant odour evolved in burning, banishes the kelp burner to desolate shores, and consequently increases the distance of the lixiviating factory; the ash in its long transit suffers much by exposure to rain; and the residuum of lixiviation, a valuable manure in the country, is a bye product in a city. It may be urged, also, that the poor kelpers in their arduous work, receive but a small part of the real value of their labour.

These evils have been frequently urged, and are universally admitted; but as no real improvements have been carried out, they are still in full force.

In investigating this subject with the view of ascertaining the best means of burning seaweed, and obtaining an ash which shall retain the whole of the iodine, I was early convinced that the process of carbonization in closed crucibles in contradistinction to open ignition gave the most perfect results in this direction. In relative experiments comparing the percentage of iodine obtained from dry *Laminaria digitata* when carbonized and when burnt into ash, I found as an average of three determinations, 0·47 per cent. in the former case and only 0·19 per cent. in the latter. These results led me to the employment of destructive distillation and the examination of the condensed distillate as well as the residual charcoal.

For this purpose various species of algæ were dried, and submitted to a low red heat in a cast-iron retort; the products of distillation were collected in a

series of large Woulff's bottles; these products were in all cases the same, differing only in quantity:—

An inflammable gas;

Water, containing carbonate and acetate of ammonia, and a kind of naphtha;

A fluid tar, containing a volatile oil, some of which also floated on the water employed for washing the gas.

A light charcoal remained in the retort; this was lixiviated with water, and treated as ordinary kelp; the solutions obtained were colourless, and yielded salts perfectly white and pure. The mother liquor formed a striking contrast to those usually seen; it was nearly colourless, and contained mere traces of sulphur compounds; the amount of iodine yielded was unusually large.

The products of distillation were then examined. The gas burnt exceedingly well, giving a flame of little luminosity at first, but becoming very luminous towards the end of the distillation. A portion collected at first gave 41·66 per cent. of carbonic acid. Another portion, collected towards the end of the distillation, gave only 13·3 per cent. of carbonic acid, and contained olefiant gas. The gas given off in the distillation of wet weed is also inflammable, but the flame is occasionally extinguished by the vapour of water thus simultaneously generated; a portion of this gas gave 50·84 per cent. of carbonic acid.

The condensed liquor was very alkaline; it yielded ammonia in abundance on distillation with lime. The ammonia appears to exist in the liquid as bicarbonate—crystals of this salt were found in some of the gas tubes. The chloride of ammonium in the crude state prepared by neutralizing this with hydrochloric acid has an odour of picoline, an alkaloid which is also found in the volatile oil. The naphtha distilled from this liquid burns with a slightly luminous flame. Rectified over lime, its specific gravity is ·826; this commences to boil at 155°; it is not a simple substance, but appears to be a mixture of acetone and methylic spirit; by repeated rectification I have succeeded in reducing the boiling point of the first portion below 140° Fahr., but I have been unable to effect any definite separation of it, either by treatment with chloride of calcium or by repeated fractional distillation. It has been found impossible to separate methylic spirit from alcohol by this means, although the boiling points of the two liquids differ by about 30° Fahr. I was not surprised, therefore, that I failed to separate the two spirits believed to be the components of this naphtha, the boiling points of which differ only 10°. The presence of acetone considerably improves its value, as a solvent of sandarac and shellac. It has also, in the crude state, a peculiar odour, from the presence in small quantity of some ethereal body, of which I have not yet obtained sufficient for examination.

The residuum in the still, after the distillation of the ammonia and naphtha, was found to be a solution of acetate of lime; distilled with hydrochloric acid, this furnished acetic acid, the last portions of which contained also butyric acid.

The tar was distilled with water, a volatile oil of very peculiar odour was thus obtained; the odour recalls that of burning seaweed. In the crude state it contains about 1·2 per cent. of the naphtha, and about 1·6 per cent. of a body analogous to creosote. Diluted hydrochloric acid removes from it about 3·7 per cent. of a mixture of volatile alkaloids containing picoline, etc., and a red pitchy colouring matter is separated. It also contains pyrrol. After purification with oil of vitriol and caustic soda, the oil presents the appearance and properties of a mixture of pure hydrocarbons analogous to those from coal-tar naphtha. Its sp. gr. is ·841, and its boiling point rises from about 180° to above 400° Fahr.

It will be applicable to many of the uses for which coal-tar naphtha is so much in demand.

The colouring matter separated by an acid from the oil is a product of decomposition. It is soluble in oil of vitriol, glacial acetic acid, alcohol, and methylic spirit, but insoluble in water.

It is, however, chiefly remarkable in containing iodine, and it holds it in such close combination that boiling solution of potash does not remove it, and it is only when fused with hydrate of potash that it can be detected. It is thus converted into oxalate of potash and iodide of potassium; it was found to contain ·35 per cent. of iodine. I do not anticipate that it will be valuable as a dye, as it shows a tendency to fade; in a chemical point of view I look forward with interest to its thorough examination when I shall have obtained it in sufficient quantity; the greater the heat employed in distilling the weed, the more of this substance is produced.

The tar, after the volatile oil had been removed, presented the appearance of Stockholm tar, which it might well replace; it was then distilled alone, and a fixed oil thus separated; this contains on an average 5·2 per cent. of a crude acid, analogous to creosote. The oil, after this has been removed by potash, is purified with oil of vitriol, and it then resembles the paraffin oil of commerce.

It will thus be seen that all these products are of considerable commercial value, and it remains now to show what are the quantities yielded.

The quantitative results of my analyses are shown in the following tables. I selected for my experiments seven of the commonest species of seaweeds. Nos. 1, 2, 3, 4 and 5 are the present kelp-bearing species. Nos. 1 and 2, the Laminariæ, are the general constituents of the "drift-weed" or "vraic venant" of the Channel Islands. Nos. 3, 4, and 5, the Fuci, constitute generally the "cut-weed" or "vraic scie" of the Channel Islands. Nos. 6 and 7, the *Zostera marina* (Nat. Ord. *Naiadaceæ*) or grass-wrack, and the *Rhodomela pinastroides*, have not yet been employed in the manufacture of kelp. They are both exceedingly common all round our coasts; the former is used for stuffing mattresses, and the latter has hitherto received no application; the amount of potash it contains is very large.

The seaweeds employed were compressed into cakes, and distilled in a small iron gas retort. The quantitative results are shown in the following tables.

The tar is that left after distilling in the presence of water. The volatile oil, having thus been removed, is stated separately, its weight being included in the aqueous portion. The paraffin oil is distilled from this tar; the paraffin in it was not estimated. The pitch left behind in the distillation was not weighed. The naphtha, volatile oil, and paraffin oil were in all cases measured, as (in the crude state) impurities tell more on the weight than on the measure.

The *Fucus nodosus*, No. 5, I could not obtain in sufficient quantity for distillation. The ammonia, tar, and oils were estimated in a tube experiment on the small scale.

The measures of gas in all the tables are only approximative. A portion of the iodine is found among the products of distillation, and that is expressed in the tables as volatile iodine.

The products obtained from the residual charcoal are also shown in the tables, the alkalies, for convenience, being expressed as chlorides. The pure charcoal is the total amount of pure carbon yielded, and shows the comparative value of each weed for heating purposes. The ash is pure, containing 20 per cent. of earthy phosphates; unadulterated kelp, as usually obtained, contains about double the quantity of ash there stated, the difference being unconsumed carbon. The amount of iodine obtained from the *Laminaria digitata* is equal to 32 lbs. per ton of kelp (20 cwt.) Mr. Paterson states the present yield of iodine from the best drift-weed to be from 8 to 14 lbs. per ton of 22½ cwt.

The iodine was in all cases determined as iodide of palladium, and the potash as the double chloride of potassium and platinum. The relative amounts of sulphuric acid contained in the ashes are given separately to show the species in which most sulphur compounds may be expected; the most valuable ash being that which contains the most iodine and chloride of potassium, and the least sulphuric acid. The yield of kelp is the fused ash obtained in an open porcelain crucible. The percentage of moisture in wet seaweeds is also given in the Table; this of course is subject to variation.

TABLE 1.—PRODUCTS OBTAINED BY THE DESTRUCTIVE DISTILLATION OF DRY SEAWEEDS, CENTESIMAL.

SPECIES.	1. Laminaria digitata.	2. Laminaria saccharina.	3. Fucus vesiculosus.	4. Fucus serratus.	5. Fucus nodosus.	6. Zostera marina.	7. Rhodomela pinastroides.
Charcoal, including ash	43·750	47·040	38·040	45·450	35·166	43·272	56·610
Tar	1·861	2·123	3·835	2·474	3·116	·805	1·078
Aqueous portion	24·509	27·151	31·988	24·978	24·434	25·341	29·931
Gas	29·880	23·686	26·137	27·098	37·284	30·582	12·381
Total	100·000	100·000	100·000	100·000	100·000	100·000	100·000
PRODUCTS FROM THE WATER AND TAR.							
Volatile oil	·707	·708	·989	·825	not estimated.	·312	·319
Paraffin oil	·698	·796	1·438	·928	1·168	·302	·404
Naphtha	·450	·427	·616	·315	not estimated.	·355	·480
Ammonia, or as	·609	·965	·736	·862	·929	·537	·611
Sulphate of ammonia	2·362	3·713	2·794	3·348	3·606	2·086	2·373
Acetic acid, or as	·194	·245	·620	·652	not estimated.	·181	·272
Acetate of lime	·259	·326	·816	·469		·241	·363
Colouring matter	·041	·093	·127	·077		·028	·029
Volatile iodine	·00724	·007039	not estimated.	·003128		not estimated.	not estimated.
PRODUCTS FROM THE CHARCOAL.							
Pure charcoal	13·862	14·695	18·398	20·529	18·578	25·068	22·358
Chloride of potassium	10·831	14·104	3·216	6·940	4·008	6·203	9·693
Chloride of sodium	10·695	9·782	8·184	7·456	6·725	7·006	6·217
Insoluble ash	6·328	6·756	5·563	9·062	4·974	3·885	16·955
Sulphuric acid	2·135	1·627	4·165	4·620	2·927	1·498	2·619
Iodine	·4788	·1582	·00985	·0382	·0422	·0457	·0378
Yield of kelp	33·335	35·112	24·381	28·782	18·159	18·444	37·460
Percentage of moisture in wet seaweeds	82·000	81·000	71·000	78·000	58·000	82·000	83·000

TABLE 2.—PRODUCTS OBTAINED BY THE DESTRUCTIVE DISTILLATION OF DRY SEAWEEDS, PER TON.

SPECIES.	1. Laminaria digitata.	2. Laminaria saccharina.	3. Fucus vesiculosus.	4. Fucus serratus.	5. Fucus nodosus.	6. Zostera marina.	7. Rhodomela pinastroides.
Charcoal, including ash	Cwt. lbs. 8 84	Cwt. lbs. 9 46	Cwt. lbs. 7 68	Cwt. lbs. 9 10	Cwt. lbs. 7 4	Cwt. lbs. 8 73	Cwt. lbs. 11 36
Tar	41·8 lbs.	47·5 lbs.	86 lbs.	55·4 lbs.	69·8 lbs.	18 lbs.	24·1 lbs.
Aqueous portion	55 galls.	61 galls.	72 galls.	56 galls.	54 galls.	57 galls.	67 galls.
Gas (approximative)	1,205 c. ft.	956 c. ft.	1,052 c. ft.	1,089 c. ft.	1,504 c. ft.	1,234 c. ft.	500 c ft.
PRODUCTS FROM THE WATER AND TAR.							
Volatile oil	253·4 oz.	253·7 oz.	354·5 oz.	295·7 oz.	not estimated.	111·8 oz.	114·3 oz.
Paraffin oil	250·2 oz.	285·3 oz.	515·4 oz.	332·6 oz.	418·6 oz.	108·2 oz.	144·8 oz.
Naphtha	161·3 oz.	153 oz.	220·8 oz.	112·9 oz.	not estimated.	127·2 oz.	172 oz.
Sulphate of ammonia	52·9 lbs.	83·2 lbs.	62·6 lbs.	75 lbs.	80·8 lbs.	46·7 lbs.	53·2 lbs.
Acetate of lime	5·8 lbs.	7·3 lbs.	18·3 lbs.	10·5 lbs.	not estimated.	5·4 lbs.	8·3 lbs.
Colouring matter	·92 lb.	2 lbs.	2·8 lbs.	1·7 lbs.		·63 lb.	·65 lb.
Volatile iodine	·1622 lb.	·1576 lbs.	not estimated.	·07007 lb.		not estimated.	not estimated.

PRODUCTS FROM THE CHARCOAL.

	Cwt. lbs.	Cwt. lbs.	Cwt. lbs.	Cwt. lbs.	Cwt. lbs.	Cwt. lbs.	Cwt. lbs.
Pure charcoal . . .	2 86	2 105	3 76	4 12	3 80	5 7	4 52
Chloride of potassium .	2 19	2 92	0 72	1 43	0 90	1 27	1 105
Chloride of sodium . .	2 15	1 107	1 71	1 55	1 38	1 44	1 27
Insoluble ash	1 30	1 39	1 13	1 91	0 111	0 87	3 43
Iodine	10·72	3·54	·221	·856	·645	1·024	·847

These analyses conclusively prove that the present method of manufacturing kelp is an exceedingly wasteful one; for not only are the constituents of the ash largely dissipated, but these valuable products of distillation are all volatilized into the air.

If calculated on the yield of kelp obtained from the weeds as shown in Table 1, the amount thus lost becomes enormous; estimating the average of the five kelp-bearing species, and taking, as a rough calculation, 10,000 tons to be the annual yield of kelp, we have the following quantities annually disposed of in this manner in Great Britain, while if M. Tissier's estimate be correct the loss in France must be more than double this :—

Volatile oil	62,500 gallons.
Fixed oil	90,000 „
Naphtha	34,000 „
Ammonia :—	
(Calculated as sulphate).....	1,216 tons.
Acetic Acid :—	
(Calculated as acetate of lime) ...	167 „
Pure carbon	6,674 „
Colouring matter	29 „
Gas	45,560,000 cubic ft.
Iodine	50,000 lbs.

These results then enable me to propose improvements which have been made the subject of patents in Great Britain and France, of which the following is a brief summary taken from my specification. "The seaweeds employed may be collected at all seasons, and dried in the open air, or in sheds by artificial heat, depending on the state of the weather. The weeds are then compressed into cakes of a convenient size by hydraulic or other pressure, to lessen the space occupied in stowage. The seaweed cakes are then carbonized at a low red heat in retorts such as are used for the distillation of products from coal, wood, and peat, and like condensing arrangements for collecting the products are also employed; preference however is given to the use of large cylindrical vessels of wrought iron, heated externally, and placed vertically, having the base and also the upper end conical. The former is furnished with an air-tight damper-plate for withdrawing the charge when the carbonization is complete, and the latter is provided with a moveable iron hopper for introducing the charge. These retorts are furnished at the upper part with conduit pipes, which carry the products of distillation to an iron main, and thence through a series of ordinary iron pipe condensers, from which the gas evolved passes through a pair of scrubbers to a gasometer. In place of retorts kilns of brick or other suitable materials may be employed, and such an arrangement as that of Schwartz for distilling peat, and other forms of apparatus used in distilling products from peat or wood may be employed. In using the apparatus above mentioned the charcoal is withdrawn into closely covered iron boxes on wheels run underneath the conical end of the retort, or into a brick chamber, from which it may be removed when cool. If iron boxes are used, they are wheeled into the drying shed, in order to heat the same, and thus economize the heat. The charcoal thus obtained is lixiviated as ordinary kelp. This charcoal contains

the whole of the iodine and potash of the seaweeds employed; it is comparatively free from sulphur compounds, and it quickly affords a colourless solution of the salts it contains. This solution is treated according to the usual well-known processes to separate the iodine, and also the potash and soda salts. The washed charcoal is thrown out in heaps to dry in the air, and may be used for heating the retorts, etc. The gas possesses considerable illuminating power, and may be used in lighting the factory, heating the stills for the purification of the oils, and if desired, the retort also. The ash resulting from the combustion of the charcoal is a valuable manure;" it usually contains over 20 per cent. of earthy phosphates. A few samples I have examined gave me the following results:—

	Laminaria digitata.	Laminaria saccharina.	Highland kelp.	Zostera marina.
Phosphates of lime and magnesia...	24·16	18·50	22·83	15·90
Carbonates of lime and magnesia...	16·10	20·11	18·38	16·37
Sand, etc.....	56·76	57·78	56·56	65·36
Charcoal	2·98	3·61	2·23	2.37
	100·00	100·00	100·00	100·00

The phosphates of magnesia predominate, and these are partially soluble in water. The proportion of phosphate is about that in Peruvian guano, and if the crude ammoniacal salt obtained by distillation were added in the proportion of about 40 per cent., a manure would be obtained worth from £10 to £12 per ton, of which from 3 cwt. to 4 cwt. would be sufficient for an acre of land. The phosphate of magnesia it contains points to its special application to beet-root and clover. Mixed with about 5 per cent. of the chlorides of potassium and sodium, it would be equally beneficial to other root and cereal crops. Liebig divides plants, according to their wants, into three classes—potash plants, lime plants, and silica plants; such a manure contains the food for all or either of these.

The products of distillation are treated as follows:—"The tar is siphoned off, and distilled with an equal measure of water in an iron tar still; the light volatile oil passes over with the condensed water, on which it floats. This is decanted, and treated with dilute sulphuric acid, which removes picoline and other oily bases, and the red colouring matter is deposited. This substance is washed and dissolved in spirit, and the solution deposits it on evaporation. The light oil is then agitated with from 5 to 10 per cent. of oil of vitriol, washed with water and caustic soda, and finally re-distilled. The residual tar, from which the light oil has been removed, is then pumped into another iron still, and a stronger heat applied. The paraffin oil is thus obtained, and purified by oil of vitriol, caustic soda, and re-distillation. The residual pitch may be employed for the manufacture of patent fuel, etc., or pumped while hot into brick ovens provided with an iron pipe to carry off the heavy vapours, and subjected to a red heat, by which a further portion of paraffin oil is obtained, and a good coke left in the still, commercially valuable to ironfounders on account of its freedom from sulphur. The liquid in the condensers, being separated from the tar, which sinks to the bottom, is mixed with excess of lime, and distilled in a capacious iron still provided with a suitable condenser. Ammonia and naphtha pass over, and are received into hydrochloric acid. The solution of acetate of lime remaining in the still is run out, evaporated to dryness, and the black, impure acetate thus obtained purified by charring, re-crystallization, distillation, or conversion into acetate of soda. The ammoniacal distillate which has been neutralized by hydrochloric acid is re-distilled till the specific gravity of the distillate rises nearly to that of water. This is best distilled by the agency of steam. The first portion which comes

over is the naphtha; this is collected separately, the weaker liquor subsequently distilled being returned to the still with the next charge. Redistillation over quick lime yields it in a state of purity. The solution of chloride of ammonium remaining in the still is run out, evaporated, crystallized, and the crystals sublimed according to the ordinary method of making sal ammoniac of commerce."

This new process offers the following advantages:—

1. Retention of the whole of the iodine.
2. Easy and rapid lixiviation, colourless solutions, and pure salts.
3. Absence of sulphur compounds in the mother liquor, great saving of oil of vitriol, and no evolution of poisonous gases.
4. Factory to a great extent self-supporting, having its own means of heat and light, the fuel being extracted from the weed itself.
5. Manufacture continuous, affording employment to the kelpers all the year round, and at a higher rate of remuneration.
6. Extension of the manufacture, as this process allows a much larger margin for profit, and admits of the lucrative working of the commonest weeds, which will not, I anticipate, be allowed to rot on the shores of Great Britain when their commercial value becomes known.

These then are the principal features and advantages of this process; no doubt improvements may be developed in its minor details when it is worked on a large scale, but its general plan I believe to be the desideratum. If it be advisable that the ash should be sold for lixiviation to replace the kelp of commerce, it may be made more portable by raking the charcoal out into the air, when it gently consumes at a low temperature, and forms a loose ash containing very little carbon; the charcoal would thus be sacrificed, though an arrangement could easily be made by which it might be allowed to fall into an open chamber under the drying shed, and its heat of combustion thus made available. I have also tried distillation in a blast of air, but although the products obtained are nearly the same, the temperature is so liable to rise with the attendant evils alluded to, that I prefer the method I have indicated.

The following Table shows the comparison of seaweed with peat in the products of destructive distillation. Peat is worked with profit in the Hebrides, and largely on the Continent, for these alone; the ash is valueless.

TABLE 3.—PRODUCTS OBTAINED IN THE DESTRUCTIVE DISTILLATION OF DRY SEAWEEDS, COMPARED WITH THOSE AT PRESENT OBTAINED IN THE DESTRUCTIVE DISTILLATION OF PEAT.

	AVERAGE YIELD OF SEAWEED. Present Kelp-bearing Species, Nos. 1, 2, 3, 4, & 5.		AVERAGE YIELD OF PEAT. By Kane and Sullivan.	
	Per ton.	Per 100 Tons.	Per ton.	Per 100 tons.
Volatile oil	289·3 oz.	180 galls.	320 oz.	200 galls.
Paraffin oil	360·4 oz.	225 galls.	157·7 oz.	98·6 galls.
Naphtha	162 oz.	102 galls.	66·3 oz.	42 galls.
Sulphate of ammonia .	70·9 lbs.	3 tons 3 cwt. 34 lbs.	22·4 lbs.	1 ton.
Acetate of lime . . .	10·5 lbs.	9 cwt. 42 lbs.	6·8 lbs.	6 cwt. 8 lbs.
Pure charcoal . . .	3 cwt. 49½ lbs.	17 tons 4 cwt. 22 lbs.	4 cwt. 103 lbs.	24 tons 11 cwt. 108 lbs.
Gas, approximative .	1,161 c. feet	116,100 c. ft.	1,475 c. feet.	147,500 c. ft.
Colouring matter . .	1·85 lbs.	1 cwt. 73 lbs.	. . .	. . .
Chloride of potassium.	1 cwt. 63 lbs.	7 tons 16 cwt. 28 lbs.	. . .	. . .
Chloride of sodium .	1 cwt. 79½ lbs.	8 tons 10 cwt. 110 lbs.	Valueless.	Valueless.
Insoluble ash . . .	1 cwt. 34½ lbs.	6 tons 10 cwt. 90 lbs.	103 lbs.	4 tons 11 cwt. 108 lbs.
Iodine	3·26 lbs.	326 lbs.	. . .	. . .
Paraffin	Not estimated.	Not estimated.	3 lbs.	300 lbs.

The peat results in the table are taken from analyses by Messrs. Kane and Sullivan, for the Irish Peat Company. It will be seen that, in the products of distillation alone, the advantage is considerably on the side of the seaweed, while the lixiviation of the seaweed ash is already a lucrative manufacture, and its value will by this process of distillation be much increased.

A glance at Table 3 will show the insignificant value of peat compared with seaweed.

Theories have been circulated amongst scientific men to show that the weeds on the Irish and Scotch western coasts only contain iodine in quantity, because they are nourished by the Gulf Stream, which impinges on these coasts, and is considered to be the carrier of iodine from the Gulf of Mexico. My experiments have led me to the conviction that iodine is pretty universally distributed in sea-water; that a large proportion of iodine is confined to a very few species of algæ, though nearly all contain traces; and that those species contain the same proportion wherever they may be found, but differing for each species and the way in which they are burnt. Thus, the weeds on which my experiments were conducted were all collected on the south coast of England, where they have been supposed to contain but little iodine. Reference to my analyses will afford a conviction to the contrary. There are many seaweeds, however, which contain little iodine, but are well worth working for potash; thus grass-wrack contains 15 per cent. in the ash, and *Rhodomela pinastroides* 16 per cent., and these have never been worked. The extraction of chloride of potassium from seaweed is not sufficiently thought of, as it is now one of our principal sources of saltpetre, on which so much depends in time of war; this is now made very largely, by the decomposition of nitrate of soda by chloride of potassium. Considering, then, the great value of seaweeds, as a source of potash, and as the only available source for that very valuable element iodine, it is not a question as to whether they should or should not be worked, but it is an absolute commercial necessity that the iodine and potash should be extracted from them; and the question is, what is the best method of doing it?

I think I may be permitted to say that the present is about the worst method that could be adopted; for the poor kelper innocently throws away in the white smoke of his vraic fire substances which thus dissipated prove an intolerable nuisance, and banish him an exile from civilization, but which collected, would keep him from rags and starvation, dangers which too often at present threaten him; in fact the whole process reminds us most strongly of the wasteful farmer's method of manuring, so aptly compared by the author of the celebrated 'Chronicles of a Clay Farm' to the creaking hearse, jolting off to the cemetery with the dead carcase, and leaving all that is noble behind.

Mr. Brady inquired whether the plants used in the experiments referred to in the paper were entire, or whether parts only of the plants were employed. He would be glad also to know whether the "Irish moss," which was abundant on some coasts, contained any appreciable quantity of iodine.

Mr. Stanford replied, that in his experiments the entire plants were employed. He was unable to state how much, or whether any iodine was contained in Irish moss.

Mr. Hanbury wished to know why the seaweeds thrown up on the south coast of England were not collected for use in the manufacture of kelp.

Mr. Stanford said, the amount of seaweed thrown up on some parts of the south coast of England was very great, and to the extent to which they contained the plants most rich in iodine they might no doubt be employed in

that manufacture. Even where the iodine was deficient, the weeds might be used as a source of potash salts. The experiments referred to in his paper were made with weeds collected on the south coast.

VESICATING COLLODIONS.

BY MR. CHARLES R. C. TICHBORNE.

Amongst the many epispastics which have been introduced from time to time, cantharides has remained pre-eminent—its certainty, and comparative freedom from pain, being its special commenders. As direct and prolonged contact with the skin is necessary to produce a vesicle, many substances have been in use as an excipient for the application of the vesicant. Some of the preparations in use at present are fluid, whilst others are applied in the form of plaster or ointment. In the first instance, if the desired effect is not produced *instanter*, rubefaction is the only result, an insufficient amount being left upon the surface to produce a blister. Vesicating collodions are preparations which, after evaporation, leave a thick coating upon the cuticle, containing a certain quantity of irritating principle: these may be considered in their actions as intermediate between the fluid and solid preparations, combining, as they do, the properties of both. It is our especial vocation on the present occasion to take into consideration the construction of a formula for the *Collodium Vesicans*. This preparation, although constantly used by some very extensive practitioners, is far from being generally introduced, which may be accounted for from the circumstance that there is no authorized formula for its preparation, if we except M. Altinger's cantharidal ether and collodion, one to two parts of the latter for children. Each maker has then his own formula, which might be excellent, or *vice versâ*, as the case may be. It will be our endeavour to provide a formula which shall have sufficient strength to produce immediate vesication, at the same time having a due regard to the economy of the method. To ensure prompt action, it is not only necessary to introduce a sufficient quantity of blistering material, but it is also requisite that the excipient, or film in which it is applied, should be permeable enough to allow the active principle to transude freely through it. The tough and contractile film left by the ordinary collodion is almost worse than useless, as immediately on drying, the cantharidin at the surface and in direct contact alone exerts any beneficial effect; an ordinary blister might be applied for any length of time, without producing a sensible result, if a dry film of plain collodion be interposed between the blister and the cuticle.

First, then, let us examine the texture of a collodion film, to mark its applicability in the present case. If we pour upon a glass slide some recently prepared collodion, and then examine it by the microscope, it will present the following appearance:—A pretty homogeneous and smooth ground, but running through which are slight ridges, which produce large honeycomb markings. These ridges are caused by the quick evaporation of the ether; the whole is interspersed with filaments of partially disorganized cotton in a semi-gelatinous state. However carefully the cotton may be prepared, it is next to impossible to get rid of these fibres, some portion always escaping the perfect action of the acids. If we can add a small quantity of glacial acetic acid to the collodion, we shall find the character of the film greatly changed. From the slower evaporation the honeycomb ridges are no longer palpable, whilst the solubility is so much increased that the filaments are found to have disappeared. This film is perfectly uniform, but it presents

this peculiarity, that it gradually dries into a mass of jelly-like globules, which however possess but little cohesion; when dry, it is very short, for if the finger be run up the glass, instead of leaving it as a tough skin, it collects as a moist crumbled mass. Having so far seen that the glacial acid, besides destroying the contractility, gives it the properties of porosity and slowness in drying, it follows that such a collodion is particularly suited for the application of any vesicant which we may intend to apply, instead of being a varnish which hermetically seals up the active matter. Glacial acetic acid is one of the best direct solvents of cantharidin with which we are acquainted. Pure cantharidin was found to be very soluble in that acid, a saturated solution depositing it unchanged on evaporation in hard mica-like crystals. The principle then that we propose is, to exhaust cantharides by a mixture of ether and acetic acid, and to convert these into a collodion by the addition of gun-cotton.

Take Cantharides, ℥vi.*
Ether from methylated spirits, f℥xiij, or q.s.
Glacial acetic acid, f℥ij.
Gun cotton, ℥ss.
Methylated spirits of wine, f℥vij, or q.s.

The cantharides, coarsely powdered, are placed loosely into a displacement apparatus, the flow of which can be regulated by a tap; upon this is poured the ether and acetic acid, previously mixed together; after the whole has passed through, it will be found that the *débris* has retained by absorption seven fluid ounces, which must be displaced by the gradual addition of an equal bulk of methylated spirits. If properly done, there is not the least danger of the admixture of the spirits with the percolated menstruum, as the animal substance of the flies swells considerably under the prolonged influence of the spirits of wine, so that the same bulk will be insufficient to quite displace the ether. The ethereal solution should then be made to measure exactly f℥xv, by the addition of a little spirit, and may then be converted into collodion by the addition of the gun-cotton. Mylabris cichorii, treated in the same manner, gives even a more powerful vesicant than the cantharides. These flies, which constituted the blister of the ancients, are, I believe, to be procured in great profusion in India. The percentage of cantharidin is larger in these flies than in the cantharides, but they resemble them in all respects excepting their physical appearance.

The most effectual method of using the collodion is as follows:—The part upon which the vesicle is to be raised should be painted with the vesicant to the desired extent, bearing in mind that the blister produced always extends to about one-tenth of an inch beyond the margin of the space covered by the collodion. Care should also be taken that there is a considerable thickness of collodion upon the surface. To ensure this the brush should be passed over and over again until about ʒss has been used to the square inch, or less when operating upon a tender epidermis. It is desirable to place a piece of oil silk, or, what is still better, a piece of sheet gutta-percha, two or three inches larger than the surface of the intended blister; the gutta-percha is not spoiled, whilst it hastens considerably the action of the collodion.†

In ten minutes, or a quarter of an hour if the cuticle is hard, the collodion

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* Two ounces more cantharides to the above proportions, make a very powerful collodion.

† The action of the gutta-percha is easily explained, by its stopping the evaporation of the exhalations of the skin; in this manner the scarf-skin is rendered moist and permeable, the ordinary dry and harsh texture of the skin militating greatly against the production of a vesicle.

should be wiped off with a little cotton-wool moistened with ether, when the blister will almost instantly rise. The principles which advocate the use of the collodion may be enumerated as follows :—Cleanliness, ease in applying to any wrinkled or jointed part, where the ordinary blister would be likely to be displaced, prompt vesication, and safety from strangury. Any of these properties would be sufficient individually to recommend its employment in preference to the other preparations.

Another vesicating collodion may be procured from the volatile oil of mustard, which could be obtained cheaply from the mustard bran. The following formula seems to work well :—

Take Volatile oil of mustard, f℥i.
Collodion, f℥vi.
Acetic acid, gtt. xx.

The acid is still retained in this formula with regard to the texture of the film. But the above collodion is not so good as that made from cantharides or the mylabris, it being more painful and not so certain in its action. For rubefacient purposes these collodions may be diluted with a further amount of collodion, and are then everything that could be desired,—the active principle being in a state of perfect solution. The *Emplastrum Calfaciens* of the Dublin Pharmacopœia would be a bad preparation were it not that the process of remelting the *Emplastrum Cantharidis* amongst the pitch literally stews all the virtue out of the fly particles. In conclusion, we may state that our remarks are not built upon our own experience, but from practical applications which these preparations have been subjected to, by competent judges, on an extended scale.

The Chairman thought it had been shown by experiments made some time ago, that acetic acid was not a good solvent of cantharidine.

Dr. Redwood said such was the case with weak acetic acid, but not with the strongest acid.

Mr. Deane observed that Pharmaceutists had for many years been under a misapprehension with regard to the use of acetic acid as a solvent for Cantharidin. In the Pharmacopœia of 1836, a process was given for the preparation of *Acetum Cantharidis*, in which acetic acid containing 30·8 per cent. of real acid was ordered ; and he believed when acid of that strength was used, the vesicating principle of the cantharides was taken up so as to render the preparation efficacious ; but it happened unfortunately that one of the largest makers of acetic acid as supplied for use in pharmacy, had misunderstood the intentions of the College, and was for many years supplying an acid of less strength than that ordered, which caused the *Acetum Cantharidis* when made with such acid to be inefficacious. He had some time ago fully investigated this subject, and caused the defect alluded to to be remedied.

The Chairman said, he recollected many years ago, when the vesicating power of *Acetum Cantharidis* of the Pharmacopœia was found to be deficient, a very efficient and powerful preparation was made by substituting glacial acetic acid for the acid of the Pharmacopœia.

Mr. Attfield stated, that in making some experiments with bromacetic acid, he had observed that it acted as a powerful vesicant, and he thought it might be worth while to try whether it presented advantages over other vesicants.

A PROCESS FOR ESTIMATING TANNIC ACID IN GALLS.

BY MR. J. H. MARRIAGE.

Observing that your number for the present month contains a process for estimating Tannic Acid, I venture to send you details of another method, which will, I think, be found equally simple, more accurate, and much more convenient than can be the case with one depending on hydrometrical measurement. It must be remarked, however, that the method now described is not applicable to *all* substances containing tannic acid, as its indications with regard to catechu and myrobalans are not to be relied on, owing, probably, to the presence of some other acid possessing the power of precipitating salts of copper. Gallic acid has not this power, and its presence is therefore no obstacle to a satisfactory experiment. With galls this process gives accurate results, as I have seen proved by careful comparison with the centigrade gelatine process.

The solution I employ is one of ammonio-sulphate of copper, containing in each decem 634 grains of crystallized sulphate of copper and just sufficient liquid ammonia to re-dissolve the precipitate first occasioned. Two septems of this solution indicate one grain of tannic acid. It occasions an olive-green precipitate, and at the same time deepens the colour of the liquid operated on. As the experiment approaches completion, the colour again becomes fainter, and with perfectly pure tannic acid would probably vanish altogether.

It is at first almost impossible to filter the liquid, but when the proper quantity of the copper solution has been added, the precipitate is readily separated. No great excess of copper can be put in unobserved, owing to the intense colour of the test solution. I find it most convenient to exhaust the powdered galls with water in the proportion of a decem to 100 grains, and in that case, if half the liquor be operated on at once, the number of septems of test solution employed directly indicates the per-centage of tannic acid.

This method, while equally accurate, has several advantages over the gelatine process. Owing to the colour of the precipitate, it is more readily employed by artifical light. A smaller quantity of test solution is required, for it is impossible at ordinary temperatures to employ a gelatine solution much stronger than so as to require *ten* septems to precipitate one grain of tannic acid, consequently the alkalimeter may require re-filling several times, occasioning loss of time and liability to error. Lastly, the copper solution may be kept for a long time unchanged, while a solution of gelatine cannot always be depended upon even the day after it is made.

I observe that Fownes estimates the tannic acid in galls at from 30 to 40 per cent., whilst Royle puts 60 per cent. as the maximum. My own experiments lead me to be dissatisfied with blue galls containing less than about 65 per cent. A sample of Chinese galls contained 52 per cent.

Bristol, 2 mo. 24, 1862.

Mr. DEANE inquired whether there was any difference between Chinese and Japanese galls.

Mr. HANBURY said, that from what he had seen of Japanese galls, he believed them to be identical with Chinese galls. He could discover no difference between them.

Mr. WOOD thought the value of the process recommended by Mr. Marriage was much lessened by the fact of its being inapplicable as a general process

or the estimation of tannic acid. The gelatine test had been rendered more easy of application by the use of alum, which promoted the separation of the precipitate.

HENBANE; ITS PREPARATIONS AND DOSES.

BY MR. BARNARD S. PROCTOR.

The frequency with which henbane is employed renders it a matter of importance that its preparations should be uniform, and of well-ascertained strength; yet on a reference to various posological tables we find considerable discrepancies. While Christison, Pereira, Rennie, and Royle say the dose of the extract is from five to twenty grains, Taylor says the medicinal dose is from five to ten grains, and that seven grains have produced alarming symptoms. If Taylor is right, surely the other authorities are spreading a dangerous error in stating the dose so high. Twelve and a half grains, which would be the mean dose according to the above authors, would surely be dangerous to many patients. Probably twenty-grain doses were in use at a time when the extract was very inferior to that with which we are now supplied, and that in the posological tables have been handed down from the past to the present, without questioning their propriety, the doses which under the changed circumstances have become not only unnecessary, but unsafe.

Henbane is the most popular and generally useful drug of its class. In 1100 miscellaneous prescriptions which I have examined, it occurred in 162; whereas opium in all its forms, including chlorodyne and preparations of morphia, but not including external applications nor preparations from poppyheads, occurred in 133; hemlock and belladonna being comparatively of very rare use. Had the estimate been made in doses, henbane would have had a still greater preponderance, as the prescriptions containing it generally ordered many doses, especially those in which henbane was an ingredient in aperient pills. But on the other hand the retail sale of opiates is very large, no doubt in many places exceeding the sale of aperient pills with henbane. However, enough has been said to show the desirableness of having the doses of henbane, and the comparative value of its preparations, clearly made out. The following list contains the books most frequently referred to for such information:—

Authority and date.	Powder dose in gr.	Extract dose in gr.	Tincture dose in m..
Christison's Dispensatory, 1842	.....	5 to 20	40 to 120
Pereira's Materia Medica, 1855	3 to 10	5 to 20	30 to 120
Rennie's Supplement, 1826	3 to 10	5 to 20	16 to 120
Royle's Materia Medica, 1856	5 to 10	5 to 20	10 (soothing)
"	.....	(hypnotic)	60 to 120
Thompson's Conspectus, 1837	.....	2 to 20	16 to 120
Phillips's Translation, P.L. 1837	5 to 10	5 to 10	30 to 120
Redwood's Supplement, 1847	3 to 10	5 to 10	
Taylor on Poisons, 1859	5 to 10	5 to 10	30 to 120
Beasley's Formulary, 1851	.....	3 to 8	20 to 90
Averages	4 to 10	5 to 15	24 to 116
Means of averages	7	10	70

Pereira gives of alcoholic extract 1 to 5 gr. or more.
Beasley ..... ¼ to 2 gr.
Taylor gives of the seeds ..... 3 to 8 gr.

Does this list represent fairly the doses used by practitioners? Consisting as it does of books of various dates and classes, it might have been expected

to approach the truth; but when we come to a critical examination, not only of the theoretical statements, but of the practical usages of the medical profession, a very different estimate is arrived at.

Dr. Barlow, in his 'Practice of Medicine' (1856), gives ninety-eight formulæ suitable for the treatment of the diseases under consideration, of which twenty contain henbane, as follows:—

11 Extract, the doses being in grains 2, 3, 3, 3, 3, 4, 4, 4, 4, 4, 5.

9 Tincture, the doses being in minims, 15, 20, 20, 20, 20, 22, 30, 40, 60, many of the smaller doses being given at short intervals, and even the forty minims of tincture as frequently as thrice a day.

In the 1100 miscellaneous prescriptions, 162 were found to contain henbane; these were divided into two classes, those in which it was apparently given for the sake of preventing the griping of colocynth, etc., and those in which the henbane was judged to be administered for its own therapeutic action. The former numbered ninety-six, the latter sixty-six, of which sixteen were extract, the dose varying from half-a-grain thrice a day to five grains at night; the remaining fifty were tincture, the dose varying from four minims occasionally, to forty minims thrice a day. In the former class, where the henbane was corrective of the action of other drugs, the dose varied from one-sixth to four grains.

Thus in practice we may say the doses are, according to

	Extract.	Tincture.
Barlow	2 to 5 gr.	15 to 60 m.
Average	$3\frac{1}{2}$ gr.	27 m.
In common practice	$\frac{1}{3}$ to 5 gr.	4 to 40 m.
Average	2·8 gr.	14 m.
As corrective	$\frac{1}{6}$ to 4 gr.	
Average	1·7 gr.	

Comparing these statements with the former table of doses, we cannot but be struck with the contrast between theoretical and practical posology. Surely all who compile tables of doses should give their serious attention to state the doses within safe bounds, so that a *medium* dose administered to a patient of ordinary constitution may not run the risk of producing alarming symptoms.

Turning to the first table, the mean of the averages gives ten grains as the dose of extract, and seventy minims as the dose of tincture. Dr. Barlow speaks of sixty minims of the tincture as a full dose, suitable for the treatment of inflammation of the brain.

Taylor says ten minims of the tincture every six hours have produced inconvenience, and seven grains of the extract have produced alarming symptoms. Dr. Garrod speaks of nine grains of good extract as a dose which few practitioners would venture to prescribe.

Having put my readers in possession of these statements, I will leave to them the task of judging what is a rational statement of the doses of extract and tincture of henbane, and will pass on to a few remarks on the equivalents of the powder extract and tincture.

In the absence of a complete analysis of this herb, we may calculate from the data given by Mr. Squire, in the 'Pharmaceutical Journal,' Vol. I. pp. 97 to 99.

Mature leaves and flowering tops, 100 parts, contain

Water ..... 83·3 Dry matter ..... 16·7

The same by pressure in a screw press yields

Juice ..... 60 parts. Marc ..... 40 parts.

The juice by evaporation yields 6·6 parts of commercial extract. I find, by drying a good firm sample of commercial extract, that it loses 20 per

cent. of water. Supposing Squire's extract to be somewhat softer than this, say 6·6 extract yield 5·0 of dry matter, then in 60 juice we have 55 parts of water, but the whole water is 83·3, therefore 27·7 of water still remain in the marc, and these will hold in solution 2·5 of dry extract according to the previous estimate equal to 3·3 of an ordinary consistence, making altogether 9·9 per cent. of soft extract contained in the fresh leaves, and as the leaves weigh 16·7 when dry, we may state roughly that 10 extract should equal 17 powder.

Supposing the tincture to be prepared from *dry* henbane, (that supplied as "Fol. Hyosc. sic.," I find generally contains 12 to 18 per cent. of water), and thorough exhaustion to be effected, 17 grains powdered henbane will equal 136 minims of tincture. How do these numbers compare with those given in the posological table?

Take the six authorities who give the dose of the powder, and it will be found thus:—

	Powder.		Extract.		Tincture.
Averages	4 to 10	=	5 to 15	=	23 to 120
Means.....	7	=	10	=	72
Instead of	17	=	10	=	132

But if we calculate the equivalents from Dr. Barlow's formulæ, and the miscellaneous prescriptions, we have

	Extract.		Tincture.
Barlow, from average doses.....	10	=	80
„ from mean doses.....	10	=	111
Common practice average	10	=	63
„ „ mean	10	=	88

which is a little nearer the calculated numbers, but still far from accounting for the discrepancy between the powder and the extract, which anomaly appears only explicable by supposing that a great portion of the active principle of the henbane is not extracted by pressure, or is destroyed during the evaporation of the juice.

Twenty years ago Mr. Squire advocated the use of preserved juices of henbane, belladonna, etc., for the sake of avoiding the evaporation which, he said, could not be effected without injury, there being always a loss of aromatic constituents. But he does not give any estimate of the loss which is sustained; probably it is too variable to have its amount calculated; nor does he appear to attach the importance to the subject which it is entitled to from a consideration of the equivalents as stated above, and from the fact that *all* authorities who state the dose of powdered henbane give it in quantities either similar to or smaller than the extract, while from the relation of the two to the fresh herb, the dose of the powder should be one-half larger. If the injury is so great as to account for these differences, and so variable that it cannot be quantitatively determined, it is most important that the process should be so modified as to give a more constant result.

The equivalent of powder, alcoholic extract U.S., and tincture, may be calculated from experiment No. 4 given below:—

Powder.		Alc. extr.		Tincture.
17 gr.	=	6 gr.	=	143 min.

These figures correspond much more nearly with the doses given by Pereira, and if any reliance is to be placed upon statements of doses, would indicate that an alcoholic extract can be evaporated without loss of activity.

In the absence of fresh henbane my experiments have been confined to the extract and dried leaves of commerce, which, as they afford the basis of my arguments, I subjoin.

No. 1. 200 grains of dry powdered henbane, rubbed with powdered pumice-stone, and then beaten into a pulp with water to ensure thorough disintegration of the tissues, were macerated in 4 ounces of water at 38° Fahr. for two days,

subjected to pressure in a screw press, by which 3 ounces of clear dark green-brown liquor were obtained. To the marc 3 ounces of water were added, and after 14 hours' maceration, were pressed off. A third infusion was obtained in the same manner, which still had some colour, was milky, and not rendered clear by filtration through paper. All the infusions, as soon as obtained, were evaporated at about 212°, yielded 70 grains tough extract.

No. 2. 200 grains dry powdered henbane, packed in a tube, were exhausted by the slow percolation of 2½ ounces of rectified spirit, which was added in successive portions of 5 drachms, with a period of maceration between each,—the last portions being pale and having no taste of henbane. The tincture, on evaporation, yielded 42 grains of hard dark-green-brown hygroscopic extract.

No. 3. 100 grains commercial extract, dissolved in 3 drachms warm water. On the addition of 6 drachms of rectified spirit, a copious precipitate was produced, which was drained in a percolator tube and washed with rectified spirit till the washings were free from the taste of henbane. The filtrate, which was clear dark brown-green, and the washings, when evaporated, yielded 50 grains hard hygroscopic extract.

During the evaporation the liquor was observed to separate into two portions, the heavier being dark green, and somewhat viscid; the lighter, mobile and brown. A drop containing some of both was evaporated on a slip of glass, and examined in the polarizing microscope. The green oily drops had become tufts of radiating double-refracting crystals. The residue of the brown liquor was also crystalline, but did not affect polarized light.

No. 4. 14 fluid drachms of tincture of henbane (the product of 100 grains of powdered henbane with proof spirit) were evaporated to dryness, yielded 36 grains friable extract, which rapidly absorbed moisture.

No. 5. 100 grains commercial extract, dried sufficiently to powder, weighed 83 grains, rubbed with rectified spirit and washed with the same in a percolator till the filtrate was free from the taste of henbane, yielded on evaporation 30 grains hard extract. The portion insoluble in spirit, after washing with water and drying, weighed 17 grains.

No. 6. 60 grains commercial extract dissolved in water, filtered, and the residue washed, yielded 35·5 clear dark brown extract and 12·5 insoluble green matter.

Per cent. soluble	59·17
,, insoluble	20·83
,, water by difference	20·00
	100·00

No. 7. 100 grains commercial extract, *thoroughly* dried, weighed 79·5 grains; treated as No. 6, gave a much browner extract.

Soluble	58·5
Insoluble	21·0
Water	20·5
	100·0

The sample of commercial extract used in these experiments was somewhat firmer than usual; that produced in experiment No. 1 was tough, almost hard; making allowances for these differences, the results correspond pretty well with those calculated from Mr. Squire's statements quoted above. By oversight, the extract No. 1 was not evaporated to dryness.

200 grains of powder gave 70 extract; therefore 16·7 of powder, which is equivalent to 100 fresh leaves, would give 5·84, still retaining 10 or 12 per cent. water, say 5·2 dry extract soluble in water. Squire's 100 parts fresh leaves by calculation contain 9·9 of extract, probably equal to 7·5 of

dry extract, from which subtract one-third of its weight for insoluble matter, gives 5·0 of dry extract soluble in water.

Thus it appears that the desiccation of the leaves has not rendered insoluble any portion of matter previously soluble in water; a supposition corroborated by experiments Nos. 6 and 7. But, on the other hand, it seems to prevent the expression of insoluble matter.

In No. 5 we have 100 grains of commercial extract when dried, yielding to rectified spirit 30 grains of dry alcoholic extract, and from No. 2 we calculate that 170 grains of powder (the equivalent of 100 grains of extract) yield to rectified spirit 35·7 of dry alcoholic extract. Difference 5·7.

In No. 3 we find 100 grains extract contain 50 grains dry matter soluble in weaker spirit (about proof), and from No. 4 we calculate that 170 grains of the powder yield 61·2 grains to spirit of the same strength. Difference 11·2.

What is the nature of these few grains of matter taken up from the powder in excess of that from an equivalent of extract? Is it chlorophyll only, or also active matter? It is perhaps not unreasonable to suppose that some of the active matter may be in the solid state within the tissues of the plant, and thus incapable of complete extraction by pressure, even if it were possible to force out the whole of the juice.

To solve this question would require experiments upon the fresh plant, and it is very desirable that the coming season should see various other doubtful points elucidated. The isolation of the active principle, or principles, and a study of their properties, would do much towards teaching us how to extract them thoroughly, and to protect them from decomposition; or, what would be still more desirable, might evolve a process by which they would be commercially produced and applied to use as a definite salt.

PHARMACEUTICAL MEETING, EDINBURGH.

The fourth scientific meeting for the present Session was held in George Street Hall, on Thursday, the 20th of March; Mr. Ainslie, President, in the chair.

A lecture was delivered on "The Dental System of Man and the Lower Animals," by Dr. J. Smith, F.R.C.S., Surgeon-Dentist, and Lecturer on Dental Surgery, Surgeons' Hall. Dr. Smith described the various external characters of the teeth in man, their development in infancy, and the component parts of which they consist, as bearing upon the treatment of dentition or teething, and of dental diseases in after life. After alluding to the amount of error and misconception prevailing in reference to such matters, the lecturer proceeded to describe the dental system met with, in various interesting instances, among the lower animals. Beginning with the invertebrata, the progressive development of the teeth was traced upwards through that division of the animal kingdom, and onwards, through fishes and reptiles, until it reached its higher forms in the mammalia. Among the reptiles and mammalia were also described those remarkable forms of teeth found in a fossil state, and belonging to such animals as the megalosaurus, the iguanodon, the dinotherium, the mastodon, and Siberian mammoth. After shortly referring to the dental system found in the carnivora, the rodentia, and the whale tribes, Dr. Smith concluded by urging the beautiful unity of design manifested throughout the whole, as testifying to the oneness of that Great Mind at work in all, a recognition of which teaching, in these and similar of Nature's works, formed the highest end gained in directing man's powers of thought towards them. After some remarks by Mr. Hepburn and Dr. Roberts, in commendation of the lecture, a vote of thanks to Dr. Smith was moved by the President seconded by Mr. Aitken, and agreed to with acclamation.

ON DIALYSIS,

OR LIQUID DIFFUSION APPLIED TO ANALYSIS, THE PREPARATION OF MEDICINES, ETC.,

A Lecture delivered at the Pharmaceutical Society of Great Britain, on the 19th of March, 1862.

BY THEOPHILUS REDWOOD, PH.D.,

PROFESSOR OF CHEMISTRY AND PHARMACY TO THE PHARMACEUTICAL SOCIETY, AND HONORARY SECRETARY TO THE CHEMICAL SOCIETY.

The term Dialysis has been applied by Mr. Graham to designate the separation of chemical atoms or molecules by *liquid diffusion*, that is, through the greater or less tendency which the molecules have to move from one part of a liquid menstruum to another, under particular circumstances. It is *chemical analysis* effected without the employment of *chemical reagents*, and it constitutes one of two very important additions which have recently been made to this department of practical chemistry. If it affords a less delicate means, as undoubtedly it does, of indicating the presence of minute quantities of chemical agents, than that which is afforded by the method of *Spectrum Analysis*, it nevertheless admits of practical applications of which the other is not susceptible, for it enables us to separate bodies from each other, and doing this through the agency of physical forces inherent in the bodies themselves, it gives us results which are free from the influence inevitably exerted, in ordinary chemical analysis, by the reagents applied.

The diffusive property of liquids closely resembles in some respects the property of volatility, by which we have long been accustomed to effect the separation of substances. Thus, to take a very familiar instance, if a cloth wetted with water be exposed to the air, the water by virtue of its volatility passes away and leaves the cloth dry, and it does this through a force inherent in the molecules of the water which gives motion to them, causing them to separate from each other, and to diffuse themselves in the air.

Again, if the cloth be wetted with a mixture of alcohol and water, the liquids will pass away and leave the cloth dry as before, but one of the liquids being more volatile than the other will pass off more rapidly, and separation of the liquids from each other will thus to a certain extent be effected, as well as their separation from the cloth.

In these cases the liquids have changed their state, have assumed the state of vapour or gas, and in that state have diffused into another gaseous atmosphere. The change takes place spontaneously on merely exposing them to such atmosphere, and it is due to the power of diffusion—of gaseous diffusion.

The term *Diffusion* has hitherto been principally applied to phenomena observed among gases and vapours. The diffusive property here is universal, and very important in its influences. No two gases can be brought into contact with each other without the occurrence of diffusion. Thus, if we have two gases contained in separate vessels, such as two bottles, and if we establish a communication between them by means even of a small tube, the contents of one bottle will immediately flow into the other, and *vice versâ*. This will even occur in opposition to gravity, for if the one gas be light, such as hydrogen, it will pass downwards into a heavy gas, such as carbonic acid or sulphuretted hydrogen, and the heavy gas will at the same time pass up into the space occupied by the lighter gas.

Here again we have an innate force in the atoms or molecules which gives them a tendency to separate from each other, and diffuse themselves among the atoms of some other kind of gaseous matter.

This, it will be observed, is quite distinct from the tendency of gases to expand under the influence of elasticity when pressure is removed, for diffusion

occurs in opposition to the pressure which may be induced by the phenomenon itself, as in the use of *Graham's Diffusion Tube.*

The laws relating to the diffusion of gases were investigated many years ago by Mr. Graham, to whom we are chiefly indebted for our knowledge of this subject. Gaseous diffusion has important practical applications in pharmacy and other departments of science. Were it not for the power of gases to diffuse into other gaseous atmospheres, liquids would not pass off in vapour, until heated to their boiling points, when their vapours would have a tension equal to the pressure of the superimposed air. It is through the influence of diffusion, therefore, that spontaneous evaporation, or evaporation at any temperature below the boiling point of the volatilized liquid, is effected.

In gases, as already stated, the diffusive property is universal, but the rapidity with which diffusion occurs varies with the nature of the gases which are presented to each other, and is dependent upon their density.

Now, diffusion in liquids, with which we have principally to deal at present, is neither so general nor so palpable as it is in gases; yet it has been found, upon careful investigation, that it has a wide range, and admits of very important practical applications.

We cannot say of liquids that the tendency to diffusion is universal, for different liquids may be brought into contact with each other without any admixture taking place, as in the case of mercury, water, and oil. Here there is no diffusion.

In other instances, when two different liquids are brought into contact, diffusion occurs as it does with gases, only much more slowly. Thus, if we bring alcohol and water into contact in a suitable vessel, the lighter alcohol being placed above the heavier water, particles of the alcohol will pass down into the water, and particles of the water will pass up into the alcohol,—in fact, liquid diffusion will occur; but observe how slowly this takes place, as indicated by the small extent to which the liquids, one of which is coloured, have become mixed after remaining in contact in the two-bulbed tube for several days.

If now we invert the tube, so as to place the water above the spirit, a position in which these liquids are often placed in preparing tinctures by the process of percolation or displacement, we at once get rapid admixture, which is not now due to diffusion, but is caused by the heavier liquid falling through the lighter.

In the case of alcohol and water, the result may be partly ascribed to a tendency in those two liquids to enter into chemical combination; we may, however, take other less exceptional cases for illustration.

If an acid or a salt be dissolved in water, and this solution be brought into contact at one of its surfaces with pure water, the liquid particles of the acid or salt will move from their original position, pass out of the solution, and mix with the water, doing this in opposition to gravity. A very extensive series of experiments of this kind have been made by Mr. Graham, who has been occupied for many years with the investigation of the subject of liquid diffusion. It appears that there is a great difference in the diffusive powers of different substances in the liquid state, just as there is in the gaseous state. Of all liquids, hydrochloric acid and the allied hydracids, such as hydriodic acid, stand pre-eminent in their tendency to diffusion.

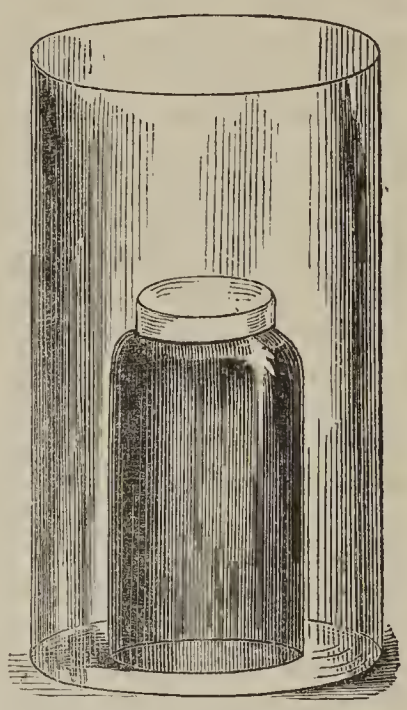
The following table represents, with reference to several substances,

The approximate times of equal diffusion:—

Hydrochloric acid	1
Chloride of sodium	2·33
Sugar	7
Sulphate of magnesia	7
Albumen	49
Caramel	98

Thus, hydrochloric acid diffuses more than twice as rapidly as chloride of sodium, seven times as rapidly as sugar or sulphate of magnesia, forty-nine times as rapidly as albumen, and ninety-eight times as rapidly as caramel.

These experiments have been made with very simple apparatus,—that first used consisting of two glass jars, one placed within the other, the inner one containing the solution for diffusion, and the outer one pure water into which the diffusion was to take place. The inner jar or phial was 3·8 inches high, with a neck 0·5 inch in depth and aperture 1·25 inch wide. This phial holds 2080 grains of water to the base of the neck, or between four and five ounces. The outer jar was seven inches high and four inches in diameter.



Phial Diffusion.

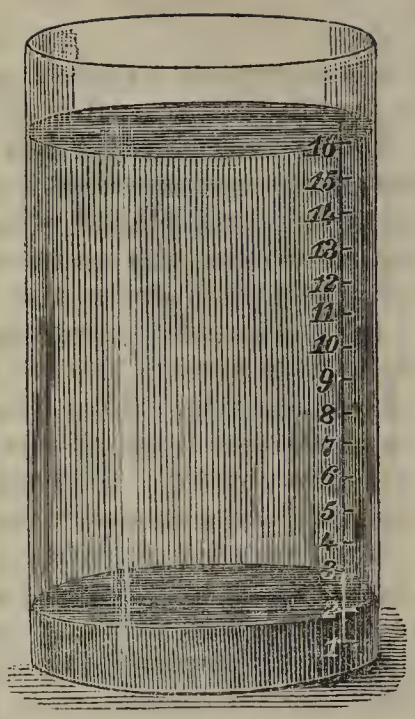
The inner jar or diffusion-phial is first filled with the saline or other solution up to the base of the neck; it is then filled up to the top with water, and placed in the outer jar, into which water is carefully poured until it rises to about an inch above the top of the inner jar. The solution in the phial is thus allowed to communicate freely with the water in the jar and the diffusion is at any time interrupted by placing a small plate of glass over the mouth of the phial, and removing it from the outer jar, when the contents of the latter may be determined by evaporation or in other ways. This is distinguished as *Phial Diffusion.*

The following table represents some of the results obtained by experimenting in this way :—

PHIAL DIFFUSION.

	Strength per cent. ofsolution	Days Diffusing.	Temps. Fahr.	Relative Amounts of Diffusion.
Hydrochloric acid	2	5·00	51·0	15·04
Hydriodic acid	2	5·00	51·0	15·11
Nitric acid, NO_5HO	2	5·00	51·2	14·74
Sulphuric acid, SO_3HO	2	10·00	49·7	16·91
Acetic acid, $C_4H_3O_3HO$	2	10·00	49·8	11·31
Hydrate potash	2	4·04	63·3	12·84
Hydrate soda	2	4·95	63·2	11·09
Ammonia	2	4·04	63·4	9·59
Carbonate potash	2	8·08	63·6	11·92
Carbonate soda	2	9·90	63·4	11·70
Chloride potassium	2	5·71	59·8	12·24
Chloride sodium	2	7·00	63·4	12·37
Chloride ammonium	1	5·71	58·8	5·99
Chloride calcium	2	11·43	63·8	15·35
Chloride barium	2	8·57	63·0	12·07
Chloride strontium	2	8·57	63·0	11·66
Sulphate potash	2	8·08	60·2	11·60
Sulphate soda	2	9·90	59·9	12·00
Sulphate alumina	2	16·17	65·4	10·21
Sulphate magnesia	2	16·17	65·4	12·79
Sulphate zinc	2	16·17	65·4	12·22
Nitrate soda	2	7·00	63·4	12·35
Nitrate lime	2	11·43	64·1	15·01
Nitrate baryta	2	11·43	64·1	15·04

Mr. Graham has latterly employed a still more simple arrangement, omitting the inner vessel, and using only a plain glass jar, such as a beaker, about six inches high and 3·45 inches wide. This is graduated from the bottom up to within an inch of the top into sixteen equal parts, like a measure-glass. Distilled water is first introduced into this jar so as to occupy fourteen of the divisions, and then, by means of a pipette with a small aperture to the end of the tube, the liquid to be diffused, if heavier than water, is slowly and carefully conveyed to the bottom of the vessel, so as to form a distinct stratum occupying two divisions. The liquid is now left undisturbed in an apartment, the temperature of which is kept as constant as possible. After a certain time the liquid is examined to ascertain the extent to which diffusion has taken place. In doing this it is drawn off very carefully with a small siphon in separate quantities each occupying one division, commencing from the top, and each separate stratum is separately examined. This is distinguished as *Jar Diffusion*.



Jar Diffusion.

Some of the results obtained by Mr. Graham in operating in this way are given in the following tables :—

JAR DIFFUSION.

TEN PER CENT. SOLUTIONS FOR FOURTEEN DAYS.

NUMBER OF STRATUM.	Na Cl.	Sugar.	MgO, SO_3	Gum.	Tannin.	Albumen.	Caramel.
16	·104	·005	·007	·003	·003	...	...
15	·129	·008	·011	·003	·003	...	...
14	·162	·012	·018	·003	·004	...	...
13	·198	·016	·027	·004	·003	...	...
12	·267	·030	·049	·003	·005	...	...
11	·340	·059	·085	·004	·007	...	...
10	·429	·102	·133	·006	·017	...	...
9	·535	·180	·218	·031	·031	·010	·010
8	·654	·305	·331	·097	·069	·015	·023
7	·766	·495	·499	·215	·145	·047	·033
6	·881	·740	·730	·407	·288	·113	·075
5	·991	1·075	1·022	·734	·556	·343	·215
4	1·090	1·435	1·383	1·157	1·050	·855	·705
3	1·187	1·758	1·803	1·731	1·719	1·892	1·725
2 and 1	2·266	3·783	3·684	5·601	6·097	6·725	7·206
	10·000	10·000	10·000	100·00	10·000	10·000	10·000

Now it results from these experiments, as indicated in the tables, that while some substances will pass from their original position in the solution, and travel to the extreme limit of the water, others manifest but little tendency to this kind of diffusion, and in the same time will pass only a little way into the aqueous atmosphere to which they have access.

The following facts are especially to be noted among those which have been established:—

1. Different substances, in solutions of equal strength, diffuse unequally in equal times.

2. With each substance, the rate of diffusion increases with the temperature, and at any given temperature is proportionate to the strength of the solution, provided this does not exceed 4 or 5 per cent.

3. There exist classes of equidiffusive substances which coincide in many cases with isomorphous groups, but are more comprehensive than the latter. Thus the same rate of diffusion is exhibited by hydrochloric, hydrobromic, and hydriodic acids; by the chlorides, bromides, and iodides of the alkali metals; by the nitrates of baryta, strontia, and lime; and by the sulphates of magnesia and zinc.

4. The diffusion of a substance into the solution of another substance takes place with nearly the same velocity as into pure water, provided the solutions are dilute; but the rate of diffusion is materially affected when the liquid atmosphere already contains a portion of the diffusing substance.

5. Substances of very low diffusive power belong to a distinct class of bodies which are all characterized by the absence of the power to crystallize. These substances have several physical and chemical characters in common. Thus, they are often distinguished by the gelatinous character of their hydrates. Although often largely soluble in water, they are held in solution by a most feeble force. In their chemical relations they are generally inert, constituting weak acids or bases. Among them are found hydrated silicic acid, hydrated alumina, and other metallic peroxides of this class, such as peroxide of iron when existing in the soluble form, also starch, gum, caramel, tannin, albumen, animal and vegetable extractive matters, and gelatine. The last-named substance, indeed, is taken as the type of this class, with reference to the properties under notice, and therefore they are called *Colloids*, from *collin*, the best sort of gelatine.

6. Substances which have a comparatively high diffusive power, are found to have, generally, the power of crystallizing; and hence are denominated *Crystalloids*, to distinguish them from the preceding.

Thus, with reference to liquid diffusion, we have two classes of substances, namely:—

1. *Colloids*, or uncrystallizable substances, which are the least diffusible; and,

2. *Crystalloids*, or crystallizable substances, which are the most diffusible.

Graham designates the former of these the dynamical, and the latter the statical condition of matter. Colloidal substances are highly susceptible of the influence of external agents, and their mutability adapts them to the organic processes of life; hence the plastic elements of the animal body, such as albumen and gelatine, are found among this class. They form a feeble union with water, and upon this appears to depend a remarkable property which the solid hydrates of some colloids possess in reference to liquid diffusion. A jelly made by dissolving gelatine in water is a hydrate of this kind. This jelly is not fluid. The water in it has lost its fluidity, and assumed the gelatinous condition, yet diffusion can take place through this mass of jelly, just as it would through water. This may be shown by substituting a weak solution of pure gelatine, or of gelose, which on cooling sets into a firm jelly, for distilled water in experiments with *jar-diffusion*. Thus, if ten per cent. of chloride of sodium be added to such a jelly while rendered fluid by heat, and this having been put into the bottom of a diffusion-jar, so as to occupy two divisions, and allowed to gelatinize, a quantity of pure jelly, free from the salt, be carefully poured over it, and quickly cooled, an

arrangement analogous to those previously described will be obtained, only the saline solution, and the atmosphere above it, will now be gelatinous instead of liquid. Under these circumstances the chloride of sodium will diffuse out of the lower stratum into the atmosphere above, at about the same rate as it would into water. This is shown in the following Table, in which are represented the results of the diffusion into water of a ten per cent. solution of hydrochloric acid during three days, and of a ten per cent. solution of chloride of sodium during seven days, and beside these are placed the results of the diffusion into jelly of a ten per cent. solution in jelly of chloride of sodium during eight days.

JAR DIFFUSION.

Ten per cent. Solutions.

Number of Stratum.	Into Water.		Into Jelly.
	HCl. 3 days, 40° Fahr.	NaCl. 7 days, 40° Fahr.	NaCl. 8 days, 50° Fahr.
16	·003	·003	·015
15	·006	·009	·015
14	·012	·010	·026
13	·022	·026	·035
12	·043	·055	·082
11	·086	·082	·130
10	·162	·165	·212
9	·308	·270	·350
8	·406	·403	·486
7	·595	·595	·630
6	·837	·823	·996
5	1·080	1·085	1·172
4	1·163	1·270	1·190
3	1·578	1·615	1·203
2 and 1	3·699	3·589	3·450

The substance, chloride of sodium, used in the experiments referred to in the last column of the above table, is a crystalloid, ranking high among diffusible substances, and the colloidal gelatine offers little or no obstruction to the diffusion of this salt. The same thing would occur if other crystalloids were substituted for the chloride of sodium. Thus chloride of copper or bichromate of potash would in like manner diffuse through the mass of jelly much as they would through water. But if, instead of putting one of these crystalloids into the lower stratum of jelly, we put a colloidal body, such as caramel there, no diffusion will take place. The colloidal mass, then, intercepts the diffusion of a colloid, such as caramel or albumen, or vegetable extractive, while it allows a crystalloid body to diffuse as it would into water itself.

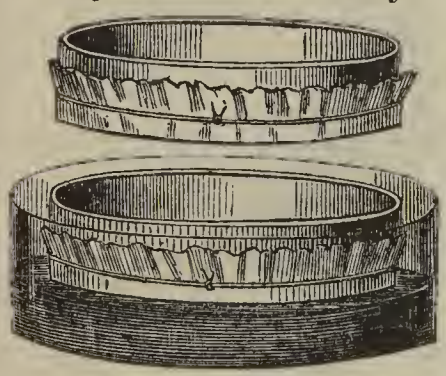
There is one great advantage in the adoption of such an arrangement as this, which is, that the results are not liable to be interfered with by the occurrence of mechanical admixture caused by other influences than that of the diffusive power. Nor is it necessary that the whole mass should consist of this colloidal jelly; a mere film of it, however thin, will answer the same purpose. The saline or other solution containing the substance to be diffused, may be separated from pure water by such a film; mechanical mixture

from other causes than diffusion is thus prevented, and much more satisfactory results obtained than by the other method of operating. A film of jelly, however, could not be practically used with advantage for this purpose; we have therefore to seek for an analogous substance which admits of being more conveniently applied. Paper sized with gelatine or with starch paste might be substituted for the film of jelly, so might bladder or parchment, or coagulated albumen, or gum tragacanth; but nothing has been found to answer so well as the substance known as "vegetable parchment," or "parchment-paper," which is made by immersing unsized paper for a short time in sulphuric acid. This paper-parchment is manufactured by Messrs. De la Rue and Co., and applied to many useful purposes, but that to which I am referring will probably be one of the most important.

When the separation of substances is effected by diffusion through a septum of this kind, it is designated by the term *Dialysis*.

Dialysis, then, is the separation of substances through a septum. The term corresponds with those of *diaphanous* as applied to light, *diathermanous* as applied to heat, and *diamagnetic* as applied to magnetism.

The apparatus used in the process is called a *Dialyser*, and is most conveniently and economically made by stretching a piece of wetted paper-parchment (which is sold by Messrs. De la Rue) over a hoop made of stout sheet gutta-percha, about two inches in depth, and of any convenient diameter, such as six, eight, or ten inches. The paper-parchment is secured to the hoop by string or by a second or outer hoop which keeps it in its place, and allows of its being removed and changed when necessary. The paper-parchment should be large enough to come up to the upper edge of the hoop, so that the liquid may be prevented from passing between them; and the parchment before being used should be carefully examined to ascertain that there are no apertures in it through which the liquid could percolate. This part of the apparatus resembles a tambourine. It is put to float upon the surface of distilled water contained in a suitable vessel, and the liquid to be dialysed is placed in the hoop on the surface of the parchment-paper to the depth of about half an inch. The water in the vessel below should be at least five or ten times as great in quantity as the liquid to be dialysed. When the water has become charged with the diffusing substance this is called the *diffusate*. The apparatus may of course be varied in a variety of ways, but that described is one of the most convenient and economical.



Dialysis, or Diffusion through a Septum.

It may be well to observe that parchment paper, or indeed any of the substances mentioned, can only be used as a septum in dialysing aqueous liquids. The septum is considered by Mr. Graham to owe its action to its condition, in the wetted state, as the hydrate of a colloidal substance, in which the water of hydration is held by a weak affinity which the superior affinity exerted by a crystalloid can overcome. Hence there is dehydration taking place in one direction and re-hydration in the other direction, through the septum during its action. A septum suitable for dialysing alcoholic or ethereal solutions remains to be discovered. Some form of collodion may possibly answer the purpose.

The following results were obtained by Mr. Graham in operating with the above arrangement:—

DIALYSIS.

24 Hours at 54° Fahr.

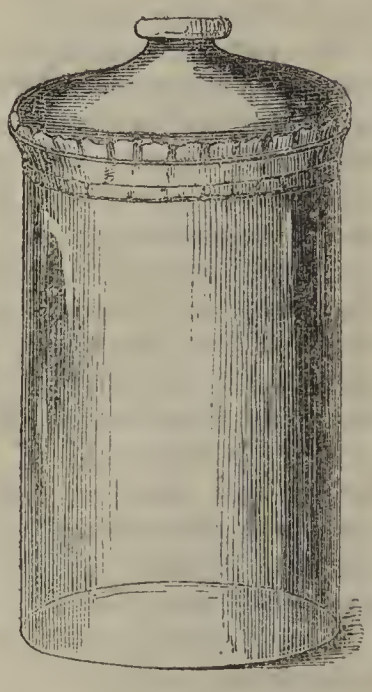
Two per Cent. Solutions.	Relative Diffusate.
Chloride sodium	1·000
Picric acid	1·020
Ammonia	·847
Thein	·703
Salicin	·503
Cane sugar	·472
Amygdalin	·311
Extr. quercitron	·184
Extr. logwood	·168
Catechu	·159
Extr. cochineal	·051
Gallo-tannic acid	·030
Extr. Litmus	·019
Purified caramel	·005

DIALYSIS.

24 Hours at 50° to 60° Fahr.

Ten per Cent. Solutions.	Relative Diffusate.
Gum Arabic	·004
Starch sugar	·266
Cane sugar	·214
Milk sugar	·185
Mannite	·349
Glycerine	·440
Alcohol	·476
Chloride sodium	1·000

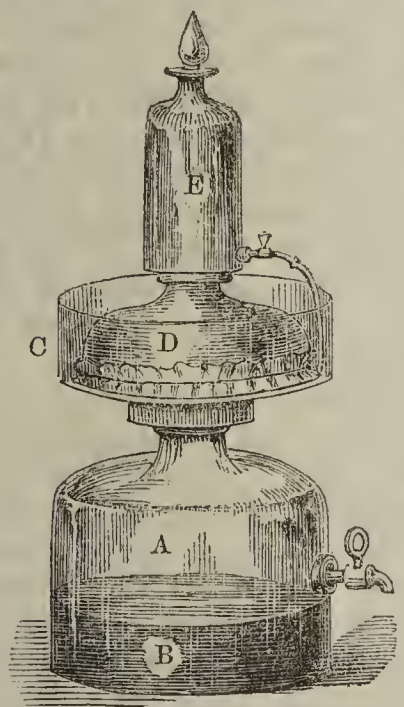
A form of apparatus for dialysis which I have found convenient, is represented by the annexed figure. The dialyser is a large-sized bladder-glass, such as is used in air-pump experiments, over the larger mouth of which (about five inches in diameter) the parchment-paper is stretched, and this part of the glass rests in the mouth of a large beaker, as shown in the drawing. The smaller mouth of the dialyser may be covered by a plate of glass, when in operation, and the liquids are thus preserved from dust or other source of injury from the external air.



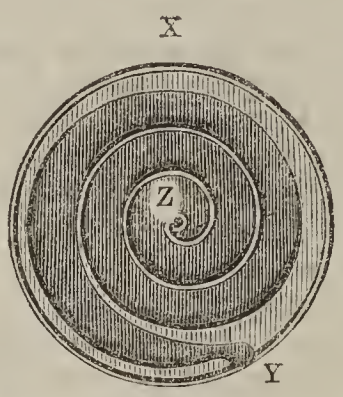
Dialysing Apparatus.

This arrangement answers well when the object is to separate crystalloids from colloidal matter without reference to the amount of water used for the diffusate, the large capacity of the beaker obviating the necessity for so frequent a change of the water as would otherwise be required; but if the diffusate is to be preserved with as little dilution as possible, a shallow vessel should be substituted for the beaker and a much smaller quantity of water used for the diffusion. In this case the diffusate must be frequently removed, and fresh water substituted, otherwise the action will be considerably retarded, if not stopped.

Sometimes it is found desirable to have a constant flow of water passing over the lower surface of the septum of the dialyser, so as to offer as little obstruction as possible to diffusion, and I have contrived an apparatus by means of which this is accomplished. It consists of a receiver, A, which is represented standing on a block of wood, B; and over the mouth of the receiver is placed a flat-bottomed, shallow dish, C, with a central tube passing into the neck of the receiver, and having on its bottom a grooved plate of gutta-percha, shown in the separate figure X. The depth of the groove in this plate is about one-eighth of an inch, and through this the water runs in a continuous stream from Y, passing off at Z through a small tube into the receiver. The dialyser, D, rests on the grooved plate, the water which fills the groove being in contact with the lower surface of the septum. E, is a bottle, from which the water runs through the small stopcock and tube into the grooved plate. Instead of the grooved plate of gutta-percha, the groove might be made in the bottom of the dish itself.



Dialysing Apparatus, with constant flow of water.



Grooved Plate of Dialyser.

Such are the arrangements for conducting the process of dialysis,—a process which presents the prospect of so many valuable applications in chemistry and pharmacy, and in other branches of science, that I thought I could not be wrong in proposing to occupy one of these evening meetings in describing it and some of the results obtained or obtainable by means of it.

The applications of Dialysis to which I propose to refer, are:—

1. For the isolation of chemical substances in a state in which they have not hitherto been obtained by other means.

2. For the separation of the more active crystallizable constituents of vegetable substances from inert colloidal matter, and the production in this way of a new class of medicines containing the active principles of plants partially purified, and in the state of combination in which they exist in nature.

3. For the separation of poisons, such as arsenic, emetic tartar, strychnine, morphine, etc., from organic impurities, such as the contents of a stomach, without the employment of chemical agents.

4. For the explanation of certain physiological and geological phenomena.

5. For the elucidation of the normal condition, as to rest or motion, of the ultimate molecules of matter.

1. Referring to the first of these applications, some very remarkable results have been obtained by means of Dialysis, in the isolation of chemical substances in a state in which we were not previously aware of their being capable of existing.

Soluble Silica.—If we take a flint or a piece of rock crystal, we have silica in a great state of purity, but it is here perfectly insoluble in water, and also in acids with the exception of hydrofluoric acid. It is true that we may get silica by precipitation, as we get it in analysis by the addition of hydrochloric acid to silicate of soda or potash, in a state in which it dissolves in water to some extent; but the solution so obtained is always mixed with the acid used and the salt formed in its production. It is not a pure solution of silica in water, nor is there any method heretofore known by which we can deprive the solution of the hydrochloric acid and salt present and leave the silica alone dissolved in the water. Dialysis, however, affords the means of accomplishing that object. The silica in the solution described appears to be in the condition of a colloid, with very little power of diffusion, while the hydrochloric acid and salt are very diffusible substances, and therefore on putting the solution into a dialyser the two latter bodies pass out, leaving the silica behind in solution in water. A pure solution of silica in water may be thus obtained, with nothing else present, and this solution may be made to contain as much as 14 per cent. of silica. This solution of silica, however, is unstable, especially when it contains the quantity of silica named. It rarely remains fluid for more than a few days, the silica then separating in a gelatinous state. If the solution be diluted it keeps better, but in either case the coagulation of the silica is effected by the addition of a small quantity, even $\frac{1}{10,000}$ part, of an alkaline or earthy carbonate, but not by caustic ammonia.

Soluble Peroxide of Iron.—Peroxide of iron, as usually met with, is insoluble in water like flint or rock crystal, yet by dialysis we can get it in a soluble state. It is well known that hydrated peroxide of iron is soluble to a considerable extent in perchloride of iron, especially if they be macerated together for some time in the cold. A deep brown solution is thus obtained, which comports itself in the dialyser very differently from the simple perchloride of iron. The latter diffuses as a crystalloid, passing through the septum unaltered; but the former, containing the oxide of iron in the colloidal state, allows the hydrochloric acid to diffuse away while the colloidal oxide of iron remains in solution in the water. The solution thus obtained, when it contains about 1 per cent. of peroxide of iron, is of a deep blood-red colour. The oxide of iron in this solution is coagulated by mere traces of sulphuric acid, alkalis, alkaline carbonates, sulphates and neutral salts in general, but not by hydrochloric, nitric, or acetic acid, nor by alcohol or sugar.

Soluble Alumina, and *Soluble Peroxide of Chromium*, may be obtained in the same way as soluble oxide of iron, and they possess the general characters of the soluble colloids of this class.

Ferrocyanide of Copper, *Prussian Blue*, and other compounds usually considered insoluble excepting when solution is effected by certain salts or other chemical agents, may also by means of dialysis be obtained in solution, free, or nearly so from such chemical agents, these latter passing away by diffusion.

These bodies, when thus obtained, are all in the colloidal state. The solutions are very prone to deposit the colloids in a gelatinous condition, and will usually do so spontaneously on being kept for some time. The solutions may therefore be compared to a supersaturated solution of a salt, such as sulphate of soda, which remains fluid under particular conditions, but may be easily made to deposit the salt in the solid state by slight influences, as will be seen on my dropping a crystal of sulphate of soda into such a solution. On doing this the whole of the fluid becomes instantly transformed into a mass of crys-

tals. It is worth inquiry whether this sulphate of soda, while it remained fluid, was not in the colloidal state.

When colloids separate from solution, without losing their colloidal state, they assume a gelatinous condition, in which they are often no longer soluble, and Graham calls this the *pectous* state, to distinguish it from the soluble condition of the same bodies.

The *pectization* of colloidal substances is sometimes observed in pharmaceutical preparations. Thus, for instance, there is an old preparation originally known as "Stahl's Tinctura Martis Alkalina," and since ordered in our Pharmacopœia (1824) under the name of "Liquor Ferri Alkalini," which is made by adding excess of carbonate of potash to a solution of pernitrate of iron. A dark brown liquid is obtained, in which the iron is held in solution in the presence of excess of an alkaline salt, the oxide of iron being in the colloidal state. It exists here as fluid colloidal peroxide of iron, for if put into a dialyser none of the iron will pass through; but it is very liable to change to the pectous state, as every one knows who has had any experience in reference to this preparation. On being kept for a short time, it sometimes becomes a gelatinous mass, the oxide of iron becoming pectous and insoluble.

When oxide of iron assumes the colloidal state it is usually combined in a high atomic proportion with the acid or salt radical with which it is associated, as for instance, in the basic chloride of iron, and also in the *Liquor Ferri Alkalini* just referred to. It has been suggested that the iron is probably in the same state in some of the scaling preparations which are now so much in use; but I find that the citrate, ammonio-citrate, and potassio-tartrate of iron, diffuse very rapidly through the septum of a dialyser, showing that the iron there is not colloidal. If a highly basic salt of this description could be formed, it would probably be otherwise.

Besides the foregoing, which are mineral colloidal substances that may be obtained in an isolated state in solution by dialysis, there are other substances belonging to the organic department of chemistry, which may in like manner be isolated, and thus presented in the soluble or in the pectous state.

Albumen, in the purest state in which it is presented in nature, namely, in white of egg, contains, as is well known, a portion of soda, which gives it a faint alkaline reaction, and to which its solubility is sometimes ascribed. This egg-albumen may be freed from its mineral constituents by dialysis. It is only necessary to mix it with acetic acid and place the mixture upon a dialyser, when all the acid with the alkaline and earthy salts diffuse away, and leave the albumen pure, so that it will burn without leaving a trace of ash. This purified albumen still retains its constituent sulphur. It has a faint acid reaction.

Gum, as represented by the best *Gum Arabic*, has been shown by Frémy to be a compound of an organic acid, gummic acid, with lime,—a gummate of lime. The lime present in this compound constitutes rather less than two per cent. of the gum. This basic constituent of the gum may be partially removed by means of oxalic acid, but its entire separation is effected with facility by dialysis. If four or five per cent. of hydrochloric acid be added to a twenty per cent. solution of gum, and the mixture placed upon a dialyser, the hydrochloric acid and lime will diffuse out, leaving the gummic acid in solution. If this be evaporated to dryness and heated for some hours at 212°, it becomes insoluble in water, and merely swells up into a gelatinous mass like gum tragacanth. In this insoluble state the gummic acid is in the pectous condition, and this is probably identical with what Frémy calls metagummic acid.

Tannin and *Caramel*, as well as the substance called *Vegetable Extractive*, belong to the class of colloidal substances, the separation of which from crystalloids may be advantageously effected by dialysis.

2. I pass now to the consideration of the second practical application I have

referred to of the process of dialysis,—namely, the separation of the more active crystallizable constituents of vegetable substances from inert colloidal matter; and the production in this way of a new class of medicines containing the active principles of plants, partially purified, and in the state of combination in which they exist in nature.

What has already been stated naturally suggests this application of the process, for if by means of dialysis we can isolate the inert colloidal constituents of a mixture, by causing the more active crystallizable constituents to diffuse away, it is obvious that these latter will be, to an equal extent, separated from the former, and will be found in the diffusate, that is, in the liquor into which the diffusion has taken place. This seems to present the prospect of a method by which a new class of pharmaceutical preparations may be obtained which would occupy an intermediate place between such preparations as tinctures, decoctions, and extracts, and the pure active principles which those preparations often contain, such as the vegetable alkaloids. There are no doubt some practical difficulties in the way of applying dialysis for this purpose, among which are the usually small proportions in which the active principles exist in relation to the inert constituents of plants, the necessarily long time occupied in their diffusion, and the large quantity of water required for the diffusate. Concentration of the diffusate by evaporation would often be necessary; and this, in the case of organic bodies easily altered under the influence of heat, would present some difficulty. The subject, however, is one for investigation, and it may be anticipated that by special modifications of the mode of operating in particular cases, valuable applications of dialysis will be made in this direction.

Some experiments I have made with opium and with aloes seem to promise favourable results, but these must form subjects for a future communication.

Mr. Attfield has suggested the application of dialysis for purifying the crude lemon juice which is imported into this country in a concentrated state.

3. The third application of dialysis to be described, is for the separation of poisons from organic impurities in toxicological inquiries. It sometimes happens that it is very important in such inquiries to avoid the use of powerful chemical agents in preparing the suspected substance for the application of tests. Thus, for instance, in testing for arsenic, acids and other chemical agents are usually employed, either to destroy organic matter that would interfere with the application of the tests or otherwise to eliminate the poison; and it is very difficult, if not impossible, to get these agents themselves perfectly free from arsenic. There may therefore be a suspicion that the arsenic was first put in with the chemical agents used, and then detected by the tests that are afterwards applied. This difficulty is perfectly obviated by resorting to dialysis. Arsenious acid and poisonous metallic salts, such as emetic tartar, may be separated from the organic impurities they would be mixed with in the contents of a stomach, or in other parts of the animal body, by means of dialysis, without using any other agent than distilled water, and the solutions thus obtained may be sufficiently pure to admit at once of the application of certain tests.

We may also get out strychnine, morphine, and other organic poisons in the same way, for these substances all belong to the class of crystalloids which readily diffuse. I have myself obtained these subtances by dialysis from the stomach, the flesh, and the blood of animals that have been poisoned, distilled water alone being used for their extraction.

We thus have three valuable practical applications, of which this new process of dialysis is susceptible. But not only does it enable us to effect important changes in solutions with which we may desire to operate, it also admits of other applications.

4. Some of the results obtained in operating by dialysis, enable us to

explain in a very satisfactory manner certain physiological and geological phenomena which have hitherto been involved in much obscurity.

The stomach of an animal is a dialysing apparatus, in which the soluble food is dialysed, and the insoluble food digested under the influence of crystalloids, supplied through the coats of the stomach by diffusion.

The abundant flow of free hydrochloric acid into the stomach, which occurs during the process of digestion, may be accounted for by referring to the analogous action in the dialysis of the basic chlorides of colloidal substances, such as oxide of iron, alumina, etc. In such cases the acid leaves the colloid and passes in the free state through the septum, and by a similar action hydrochloric acid is probably supplied to the stomach.

The nutritive constituents of food belong to the class of colloids, which are retained in the stomach while the act of digestion proceeds under the influence of crystalloids that are dialysed into that organ, and then pass on to undergo new changes connected with absorption, assimilation, and excretion.

The action of medicines must be considerably influenced by the state in which they exist as colloids or as crystalloids. Thus iron in the state of chloride, sulphate, or other crystalloidal salt, would be diffused through the coats of the stomach, but not so if in the state of a colloid, such as basic chloride, or basic nitrate, in which state it would pass into the intestines, exerting its action probably throughout the entire length of the alimentary canal. Is it not from this difference in their action that some preparations of iron colour the excrements, while others do not?

It will be important to determine the diffusive power of many preparations used in medicine, as a guide to the physician, and it may be found desirable to devise new preparations, where such are deficient, to represent certain medicinal agents in the colloidal as well as the crystalloidal state.

Not only the physiologist, but also the geologist, derives important aid from the study of liquid diffusion in the explanation of phenomena occurring in his department of science. The question is often asked, what is the origin of flint and other forms of silica, of oxide of iron, of alumina, and other substances, which, although usually accounted insoluble, are found in nature under circumstances clearly indicating that they have been deposited from solution. This question may be answered by referring to the solutions of all these substances which are obtained by dialysis.

5. Lastly, we derive from the study of the phenomena connected with the diffusion of liquids, an additional indication that the molecules of matter are active, not quiescent,—that their normal condition is that of motion, not of rest.

This accords with what appears to be a favourite opinion among many physicists, who are disposed to refer not only the phenomena of light and heat to motion, but those also of electricity and magnetism, and even chemical affinity.

Cases sometimes come under our notice in which the activity of the molecules of matter is rendered obvious, as for instance when binoxide of nitrogen and oxygen are presented to each other. It is not necessary that they should be mixed; if a communication be established between the vessels containing them, they immediately rush together and enter into chemical combination, as shown by the deep red gas which results.

So again, this ammonia, which now appears to be at rest while it is confined by immersing the mouth of the vessel containing it in mercury, will give palpable evidence of the activity of the molecules if water have access to it, for they will instantly rush together with much force.

There is no doubt of the activity and motion of the molecules in such cases; and so also, by the careful study of what occurs when different substances in the liquid state are brought into contact, we obtain indications of the existence of a similar, although less evident, molecular motion.

I have thus endeavoured to show that the subject of liquid diffusion and

dialysis, which has been so ably and successfully developed by the Master of the Mint, affords matter for contemplation and speculation to the philosopher, while at the same time it opens a new and a wide field for further investigations in which there is work for many practical men,—work for the physiologist, the geologist, the chemist, and the pharmaceutist; and it has been chiefly with the view and in the hope of exciting an interest in its study and applications among the last-named class, that I have made it the subject of this evening's discourse.

ORIGINAL AND EXTRACTED ARTICLES.

ALLOXAN FOUND BY DIALYSIS IN AN ANIMAL SECRETION.

BY BARON LIEBIG.

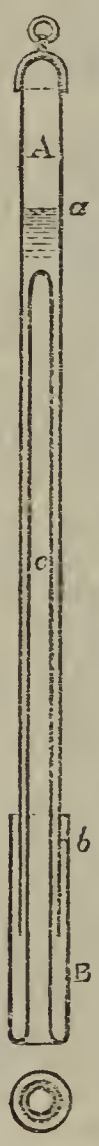
The recent investigations of Graham on diffusion are too interesting of themselves to require any recommendation to the notice of chemists and physiologists. In this note, therefore, I will only refer to how exceedingly important Graham's new method is for the separation of organic compounds, in the analysis of animal secretions. Every one occupied with such matters knows that the investigation goes well generally till an uncrystallizable viscous mass is obtained, out of which nothing more is separable by means of alcohol, ether, or precipitating reagents. In using the dialyser, the separation of the crystallizable bodies still contained in this mass, gives no longer the least difficulty. Graham describes already such a separation of the crystallizable and non-crystallizable bodies contained in urine. An experiment which I made with the extract of meat (two parts of meat heated on a water-bath with one part of water) gave, according to his method, a nearly colourless diffusate; from which, after concentration in a water-bath, very pure crystals of Creatine were deposited. There were found, besides, all the other crystallizable bodies present in meat extract.

Amongst the experiments made by me, the following gave a very unexpected result:—Having accidentally collected a portion of gelatinous mucus, derived from a bowel inflammation, and kept it in a beaker in the open air, I observed that the fluid which had crept up the sides of the glass and there dried, had assumed a pink colour. This caused me to soak the dry and somewhat viscous mass in water, and afterwards place it in a glass tube about an inch and a half wide, closed with parchment-paper, which I then put in distilled water. After twenty-four hours the water showed the following reactions: it was colourless, of a weak saline taste, and gave a red spot, when dried and heated on platinum foil. A portion of it, mixed with a drop of prussic acid, gave, after the addition of ammonia and standing, or directly, by pressing the glass surface under the liquid with a glass rod, fine white needles of *oxalan*. Mixed with sulphuretted hydrogen the fluid became turbid, from the separation of sulphur, and gave then, with baryta water, a violet-blue precipitate. A portion, dried and mixed with ammonia, formed, after a short time, gelatinous mycomelinate of ammonia. From this the presence of alloxan in the mucus examined cannot be doubted.

As alloxan is an intermediate product, which must always be formed during the transformation of uric acid into urea, we can only be astonished that it has not been met with before. I have till now looked in vain for it in blood and meat extract. The extract of meat, it is true, becomes turbid after standing with sulphuretted hydrogen, but the sulphur then separated must have another cause.

REPORT OF THE RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATIONS, AND OF THE APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On a New Form of Barometer.—Mr. R. Howson has recently patented a new form of Barometer, the essential working parts of which are represented in the accompanying drawing. The object of the invention is to add to the sensitiveness of the well-known Torricellian column by giving it a comparatively increased range, or greater extent of rise and fall. This is effected by employing a tube similar to that of the common straight Barometer, except that in the place of the entire bore of the tube being filled with mercury, the central portion is occupied by a light stalk or closed tube; and instead of making the cistern fixed as in the ordinary Barometer, it is attached to this stalk, so that the cistern stalk and fluid are held in suspension, and rendered free to rise or fall by every increase or decrease of pressure.



A is the barometer tube; B, the cistern; and C, the stalk; these different parts, A, B, and C, being shown in the position which they occupy relatively to one another, and to the mercury with which the instrument is filled. The tube A is freely suspended, and its lower end dips to a greater or less depth into mercury contained in the cistern. The stalk C (which is supposed here to be of glass tube sealed at both ends) is attached to the bottom of the cistern B concentrically therewith, and it passes axially up the tube A, terminating a little below the top of the column *a*. The immediate consequence of this arrangement is that the top of the stalk comes into a region of the barometric column where the downward pressure upon it is necessarily very small, so that there is an excess of upward pressure exerted by the atmosphere outside, which tends to push the cistern upwards, and actually does so unless the weight of the cistern with its contained mercury up to the level *b* (and stalk included) is at least equal to such excess. So long as these opposing forces are *in æquilibrio* the cistern remains stationary, but if the cistern should get lighter from any cause it will ascend, if it should get heavier it will descend. This is precisely the action which takes place under the influence of the fluctuations of atmospheric pressure. As soon as a barometric rise occurs, a portion of mercury leaves the cistern, passes into the tube, and accumulates above the top of the stalk. The cistern simultaneously ascends through the influence of the same force, and only comes to rest at a higher level, when the increased displacement caused by the immersion of the tube A in the mercury of the cistern exactly balances what has gone out of it; the converse action of course holds good when a fall occurs in the pressure of the atmosphere. Thus it is that when the column moves, the cistern also moves simultaneously, dragging the column with it, to a new position, and the range is enlarged over and above the ordinary barometric range by an amount which is determined by the ratio which the internal area of the tube A bears to the area of glass which bounds it.

The action of the instrument may also be regarded as that of a long piston or plunger working in a cylinder, with a vacuum above it and a self-gradnating weight below. The stalk may be considered as the body of the piston, and the mercury as a mobile packing. The piston moves in obedience to atmospheric fluctuations, and the packing does so as well, the entire range of the top of the column being compounded of the two motions, as before explained.

It will be inferred from the foregoing description that the most convenient mode of taking observations with this construction of instrument will be to read off the indications afforded by means of a scale applied to the top of the column. This however is not the only way in which observations may be taken. The scale for instance may be applied to the cistern, either vertically to measure its motion direct, or circularly, that is

to say, as a dial and pointer (like that of the well-known wheel barometer), the pointer being worked by the motion of the cistern through the intervention of a rack and pinion, or other suitable mechanism. Readings may also be taken by a system of measuring the difference of level between the top of the column *a* and the surface of mercury *b* in the cistern. All measurements taken in this manner will clearly correspond to similar measurements taken from the common standard barometer for the time being, any given oscillation will show of the same length in both instruments. The indications taken from either the top of the column or the cistern are not confined to any particular limit of range; on the contrary, it is possible to obtain a great variety of ranges. For instance, if the interior area of the tube A be made equal to the area of the material of which it is composed, it is not difficult to see that the range of the cistern will be equal to the barometric range, and that of the top of the column will be double the barometric range. If a more extended range is required in any proportion it is only necessary to make the internal area of A correspondingly in excess of that of the annulus which bounds it, or, in other words, of the displacing element.

On the Detection of Bismuth in presence of Copper.—Messrs. Abel and Field, in a paper on the analysis of commercial coppers recently read before the Chemical Society, have described a very convenient and delicate means of detecting small quantities of Bismuth in copper, which is based upon a curious reaction exhibited by Iodide of Potassium in the joint presence of Bismuth and Lead.

When iodide of potassium is added to a solution of a lead-salt, it is well known that yellow iodide of lead is precipitated, which dissolves on heating the liquid, and is re-precipitated, on cooling, in brilliant golden-coloured scales. (The solution of the amorphous iodide may be greatly facilitated by the addition of a small quantity of hydrochloric acid.) If the least trace of bismuth is present in the lead-salt, the re-precipitated scales are no longer yellow, but assume a dark orange or crimson tint, varying in intensity of colour according to the amount of bismuth present. This test is of such extraordinary delicacy, that 0·00025 of a grain of bismuth may be detected in copper with the greatest ease, the iodide of lead becoming dark orange, while 0·001 grain imparts a reddish-brown tinge, and 0·01 grain a bright crimson, the scales resembling chromate of silver in appearance.

The mode of operation in applying this test is as follows:—About 100 grains of the copper to be examined are dissolved in nitric acid; a solution of nitrate of lead, equal to about 5 grains of the salt, is added, and subsequently ammonia and carbonate of ammonia. The precipitate is washed with ammoniacal water, to free it from copper, and dissolved in warm acetic acid. Considerable excess of iodide of potassium is introduced, and the liquid is warmed until the precipitate disappears. On cooling, the crystalline scales will show, by their colour, the presence or absence of bismuth.*

By the employment of the test just described, bismuth has been detected in many specimens of very pure copper. Nearly all the modern copper coinage, more especially that of the reigns of George III. and IV., contains very considerable traces, and in the new bronze currency it is abundantly evident. It is found also in the silver money of England, as well as of other countries, owing, probably, to the copper with which it is alloyed. Copper which has been rolled out to a ribbon, has been found to contain it to the extent of at least 0·02 per cent., while in some specimens of commercial sheet copper, as much as between 0·10 and 0·20 per cent. has been discovered. It may also be traced in nearly all copper gauzes, wires, and foil.

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* Iodide of lead is very soluble in the acetates of soda, potassa, and ammonia, even in the cold, forming colourless solutions, from which iodide of potassium, added in excess, precipitates iodide of lead in the crystalline state, although no heat has been applied. Gmelin, in mentioning many solvents of this compound, does not allude to the acetates of the alkalies, which dissolve it with infinitely greater ease than any of the others which are mentioned.

THE POISONOUS EFFECTS OF CARBONIC OXIDE.

BY H. LETHEBY, M.B., M.A., PH.D., ETC.;

PROFESSOR OF CHEMISTRY AND TOXICOLOGY IN THE MEDICAL COLLEGE OF THE LONDON HOSPITAL.

A good deal of misapprehension seems to prevail respecting the poisonous action of carbonic oxide. On the one hand, accidents have somewhat recently occurred where in all probability the effects of the gas were entirely overlooked; and on the other, fatal consequences have been unjustly attributed to it. Some of this confusion is due to the circumstance that our standard works on poisons and medical jurisprudence have either omitted the subject entirely, or have discussed it in very meagre language. The recent catastrophe at the Hartley colliery, and the remarks which have been published respecting the supposed influence of the gas in causing the death of the men, have created an opportunity for a re-examination of this question.

Carbonic oxide was discovered by Priestley long before the close of the last century; and in 1802, Clement and Desormes, at the instance of Guyton Morveau, undertook a careful examination of its properties. They not only proved its chemical nature, but they also ascertained that it was a poisonous gas. Birds put into it dropped dead before they could be taken out; and when the experimenters themselves attempted to breathe it, they were attacked with giddiness and faintness. This experiment was repeated by Sir Humphry Davy in 1810, who says that when he took three inspirations of it, mixed with about one-fourth of common air, the effect was a temporary loss of sensation, which was succeeded by giddiness, sickness, acute pains in different parts of the body, and extreme debility; some days elapsed before he entirely recovered. It is, he says, fatal to animal life.

About the same time, the researches of Nysten demonstrated that the gas was capable of producing great disturbance of the system when injected into the veins; and although he concluded that the effects were of a mechanical nature, yet the accounts which he has given prove that the gas is a dangerous poison.

Later still, in 1814, the two assistants of Mr. Higgins, of Dublin, made experiments with it upon themselves, and in one case, that of Mr. Wilter, with almost a fatal result. Having exhausted the lungs of air, he inhaled the pure gas three or four times, and was suddenly deprived of sense and volition; he fell upon the floor, and continued in a state of perfect insensibility, resembling apoplexy, and with a pulse nearly extinct. Various restorative means were employed, but without success, until they resorted to the use of oxygen, which was forced into his lungs, and then his life was restored; but he was affected with convulsive agitation of the body for the rest of the day. He suffered also from violent headache, stupor, and a quick, irregular pulse. Even after mental recovery he suffered from giddiness, blindness, nausea, alternate heats and chills, and irresistible sleep. The other gentleman, after inhaling the gas two or three times, was seized with giddiness, tremor, and incipient insensibility. These effects were followed by languor, weakness, and headache of some hours' duration.

Since those experiments were made, others of a more extended character were instituted by Tourdes and by Leblanc. Tourdes found that rabbits were killed in seven minutes when they were put into a mixture of one part of the gas with seven of atmospheric air. A fifteenth part of the gas in common air killed them in twenty-three minutes; and a thirtieth part in thirty-seven minutes. Leblanc's experiments were made in conjunction with Dumas, and he ascertained that one per cent. of the gas in atmospheric air would kill a small dog in a minute and a half, and that birds were killed immediately in a mixture containing five per cent. of it.

Very recently I have myself ascertained that air containing only 0·5 per cent. of the gas will kill small birds in about three minutes; and that a mixture containing one per cent. of the gas will kill in about half this time. An atmosphere having two per cent. of the gas will render a guinea-pig insensible in two minutes; and in all these cases the effects are the same. The animals show no sign of pain; they fall insensible, and either die at once with a slight flutter,—hardly amounting to convulsion,

—or they gradually sleep away as if in profound coma. The post-mortem appearances are not very striking: the blood is a little redder than usual, the aurieles are somewhat gorged with blood, and the brain is a little congested. In birds there is nearly always effusion of blood in the brain, and it may be seen through the transparent calvaria, by merely stripping off the scalp after death.

Accident has also demonstrated how injurious the gas is even to the human subject. For many years past attempts have been made to promote the use of water-gas as an agent of illumination. The gas sometimes contains as much as thirty-four per cent. of carbonic oxide. It is obtained by passing steam over red-hot charcoal; and as the steam is decomposed by the ignited carbon, the hydrogen is set free, and carbonic oxide, with carbonic acid, is produced. Patents for this process of manufacturing gas date as far back as the year 1810, and they have at various times been put into operation in this country and on the continent. Sellique, in 1840, obtained permission to use the gas in the towns of Dijon, Strasburg, Antwerp, and two of the faubourgs of Paris and Lyons. At Strasburg an accident occurred which put a stop to its use. The gas escaped from the pipes into a baker's shop, and was fatal to several persons; and not long after an aeronaut, named Delcourt, incautiously used the gas for inflating his balloon. He was made insensible in the car, and those who approached the balloon to give him assistance fainted and fell likewise. The use of the gas has therefore been interdicted on the continent.

Another source of danger from it is in the combustion of carbon. It is found in the neighbourhood of brick-kilns and furnaces. The gases discharged from the latter contain it in large proportion. Iron furnaces produce it to the extent of from twenty-five to thirty-two per cent., and copper furnaces from thirteen to nineteen per cent. In the year 1846, M. Adrien Chenol was anxious to ascertain the properties of the gases yielded by his process of smelting zinc ores with carbon; and, not having a suitable instrument for collecting the gases, he attempted to draw them out of the furnace by means of a pipette. Some of the gas was thus inhaled, and he fell immediately, as if he had been stunned; the eyes were turned back in the orbits, the skin was discoloured, the veins were swollen, and presented a black tint under the skin; there were violent pains in the chest, and the brain felt powerfully oppressed. After removal to the open air, and the application of restoratives, sensibility gradually returned, but the internal pains were still severe, and there was a feeling of suffocation. For several days he felt depressed and languid; the digestion was bad; sleep was obstinate and heavy, and it was frequently disturbed by cramps in the knees and toes. Even for months afterwards there was a morbidly excited state of the nervous system.

In a more diluted condition the gas is still able to exert an injurious action, and it is very probable that the singular catastrophe which happened at Clayton Moor, near Whitehaven, in the summer of 1857, was caused by the diffusion into the air of carbonic oxide from the neighbouring iron furnaces. There is a row of cottages near to these furnaces, where, in the month of June, 1857, a number of persons were suddenly seized with insensibility, which soon passed, in some cases, into coma and death. About thirty persons were thus attacked, and six of them died. The effects were attributed at the time to the escape of sulphuretted hydrogen from the slag on which the cottages were built; but it is more probable they were caused by the oxide of carbon from the furnaces.

Lastly, it is worthy of remark that very recently Boussingault has noticed that the leaves of aquatic plants give off carbonic oxide and marsh gas, when under the influence of solar light; and he asks whether this gas so produced may not be concerned in the unhealthiness of marsh districts.*

A more complete acquaintance with the effects of this poison is a great desideratum, although enough is known to indicate its general mode of action, and to furnish evidence for its discovery.—*Lancet.*

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* See March number of the 'Pharmaceutical Journal,' pp. 472, 473, and 479.

ON THE COMPOSITION OF CHLORIC ETHER.

BY A NORMAN TATE, F.C.S.

I had lately occasion to examine some samples of the so-called chloric ether (a solution of chloroform in spirits of wine), and finding the proportion of chloroform and spirit to differ materially in the several samples, I procured a number of specimens from different respectable druggists' shops in Liverpool and Birkenhead. Upon examination I found the composition of these samples to vary considerably, as will be seen by the results I obtained from the analysis of the following thirteen specimens:—

No. 1	contained in 100 parts by weight	13·4 parts of chloroform.
2	.....	14·8
3	.....	13·5
4	.....	13·3
5	.....	14·6
6	.....	11·3
7	.....	16·5
8	.....	12·9
9	.....	12·7
10	.....	10·4
11	.....	10·5
12	.....	13·0
13	.....	19·8

Thus it will be seen that there is a difference of about 9½ per cent. between the strongest and weakest samples. It is greatly to be desired that some definite formula should be given for the preparation of this useful and much employed medicine, for it is utterly impossible for medical men to rely upon the effects of their prescriptions, when so great a difference exists in the composition of the medicines they order.

Laboratory, 79a, *Lord Street*, *Liverpool*, *March* 8, 1862.

POISONS NOT ALWAYS POISONS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—I have pleasure in sending to you the enclosed, a copy of the communication by Mr. Holt (1818), believing that it forms an interesting addendum to Mr. Attfield's paper, 'Pharmaceutical Journal,' vol. iii. p. 453.

Yours respectfully,

March 6, 1862. GEORGE WHIPPLE.

"A few months since, having occasion for some sulphate of zinc, I proceeded to examine my collection of metallic salts, amongst which I expected to find what I required. I readily found the paper, in which the label informed me the sulphate of zinc had been; but was much surprised to find none in it. A considerable quantity of minute particles of a yellowish-brown substance were scattered through the paper, some adhering to it, and all held together by an extremely fine silky thread. On removing the various papers, and searching to the bottom of the box, I discovered a portion of the sulphate of zinc, enveloped in a heap of the powdery substance. When I took it up a very large spider ran out of it, and hid itself amongst the papers. The salt, with the exception of a thin shell, had been completely eaten by the insect. Never having met with or heard of a parallel circumstance, I was induced to investigate more minutely, with the view of discovering if I might not have been deceived. On recovering the spider I found it was of the species *Aranea scenica*.

"It had assumed a perfectly black colour; was, on being approached or disturbed, remarkably brisk in his motions; but at other times would drag its legs after him in a peculiarly sluggish manner. Having cleaned the box, I deposited the insect in it, with a lump of nearly two ounces of sulphate of zinc. In about ten weeks he had

pierced this also; and, as usual, had produced a considerable portion of the powder. I then deposited other metallic salts, as sulphate of iron, lead, and copper, muriates of lead and mercury, and nitrates of copper and silver, with the sulphate of zinc in the box; but the spider did not leave the latter, nor did he touch either of the other salts, though I removed the sulphate of zinc for a time from the box. Being thus satisfied of the fact, I endeavoured to ascertain if the salt had undergone any chemical change in passing through the spider. I caused him to fast two days, then deposited him in a clean box, with 200 grains of sulphate of zinc; and when I perceived he had nearly eaten half of it, I carefully weighed the remainder with the powdery substance. It weighed 170 grains; here was a loss of nearly thirty per cent. This, however, might be in part water. I therefore collected sixty grains of the powder, on which I poured six ounces of boiling water. A considerable part remained undissolved, though frequently agitated, during two days. Ten drops of sulphuric acid were then added, and the whole was dissolved. It seems probable, therefore, that the sulphate of zinc has been deprived of part of its acid in passing through the spider.

"The insect at this time seems perfectly healthy, having eaten nearly four ounces of the salt in about six months."—'Annals of Philosophy,' December, 1818, vol. xiv., fol. 454.

THE SUPPLY OF MEDICINES TO CHARITABLE INSTITUTIONS.

COURT OF QUEEN'S BENCH, GUILDHALL, FEB. 21.

LUCKOMBE AND ANOTHER *v.* ASHTON AND ANOTHER.

Mr. Cleasby, Q.C., and Mr. Field appeared for the plaintiffs; and Mr. Serjeant Parry and Mr. Joseph Sharpe for the defendants.

The plaintiffs in this action were Messrs. Luckombe and King, who carry on business on Snow Hill, as chemists and druggists, under the style of Messrs. Hodgkinson and Co., and they brought the present action against the defendants to recover the sum of £417. 12*s*., being the balance of their account for medicines supplied for the use of the Blenheim Dispensary, in Blenheim Street, Oxford Street, an institution which had become first indebted, and then defunct. The defendant, Mr. Ashton, of Cavendish Square, was surgeon and sub-treasurer, and the other defendant, Dr. Wain, of Grafton Street, was one of the physicians to the institution, but, though they admitted that the goods had been supplied by the plaintiffs on the orders of the committee of which the defendants were members, they denied that they were personally liable, and contended that the medicines were supplied on the credit of the funds of the institution only. It appeared the plaintiffs had supplied the dispensary for several years, but their present demand was for medicines supplied from the year 1852 to 1856. During this period the committee consisted of the medical officers, who were six in number, but these gentlemen seemed to have been more successful in obtaining patients than in collecting money from the public; so that towards the end of the year 1856 the plaintiffs in sending in their bill reminded the committee that a portion of it was contracted so far back as 1852, and that, as this was "totally at variance with all business," they had decided not to supply their institution with medicines beyond the end of the year, unless the committee would make satisfactory arrangement for the early payment of future supplies, and the gradual but certain liquidation of the outstanding debt. In consequence of this letter the six medical officers (including the two defendants) gave the plaintiffs a written undertaking to pay their future bills within one month from the expiration of each quarter, but no arrangement was made for the liquidation of the old debt. The plaintiffs from time to time pressed for their money, and the defendants, who had added some lay gentlemen to their committee, made several appeals to the public, and on one occasion they received as much as £500 as the proceeds of a fancy fair got up in favour of the charity; but of this sum as much as £400 was swallowed up in clearing off a liability incurred by one of the committee in respect of a lease taken of some new premises for the dispensary in the Portland Road. Eventually the institution, which during its existence had administered to the necessities of upwards of 100,000 poor patients, was given up, and the plaintiffs, when they applied to the medical gentlemen, were put off from time to time, till at length, to save the Sta-

tute of Limitations, they were obliged to bring the present action. Indeed, a large portion of their claim would have been barred but for the circumstance that, on the 19th of January, 1856, the two defendants and some other members of the committee had given the plaintiffs a check on Messrs. Herries and Co., the bankers to the dispensary, for the payment of £30 on account. The two defendants were examined in support of their defence, that the goods were supplied on the credit of the funds of the institution, and it appeared from the evidence of Mr. Huggins, the brewer, that he had offered to pay the plaintiffs the sum of £200 out of his own pocket, in full discharge of their claim, but this offer was refused.

Lord Chief Justice Cockburn summed up the evidence to the jury, and in so doing particularly called their attention to the plaintiff's letter of the 2nd of December, 1856, and finally left it to the jury to say whether the medicines were supplied on the credit of the defendants, or whether the plaintiffs looked for payment out of the funds of the institution.

The jury retired, and eventually found for the plaintiff for the amount claimed—viz., £417. 12*s*.

MISCELLANEA.

Accidental Poisoning.—An inquest was held at the Roscommon County Infirmary, February 11th, by Richard Garnett, Esq., on the body of a man named Michael Carney. From the evidence adduced, it appeared that the deceased was in the habit of getting a draught at night, and that on the day in question a bottle of liquid used only by the apothecary as a lotion, had been left in the ward on a shelf next the bottle containing the draught, a caution having been given to the patients not to meddle with it; that a man named James Balfour, who had not been present when the caution was given, poured some liquid out of this bottle in mistake, and gave it to Carney, who drank it, and then cried out, "You gave me the wrong bottle! I'm done! send for the doctor." Dr. Peyton was in attendance in a few moments, and administered antidotes, but to no purpose. The man died in about two hours and a half afterwards. The jury returned a verdict in accordance with the facts.

Charge of Manslaughter against a Chemist's Assistant.—At Stafford, March 14, before Mr. Baron Channell, Edward Richard Perks, a chemist's assistant, surrendered to take his trial on the charge of manslaughter, in causing the death of Thomas Winter, on the 18th of January, at Yoxhall.

Mr. Vaughan conducted the prosecution; Mr. Motterham defended the prisoner.

It appeared that on the 6th of January Thomas Winter requested the national schoolmaster of Yoxhall to fetch some powders for him from the shop of a chemist at Lichfield, and gave him a paper as his instructions. The schoolmaster asked the prisoner for one ounce of *ethiops mineral* and one ounce of cream of tartar, which were given in two separate packets, the former being labelled "ethiops mineral, poison." The prescription was not shown to the prisoner, neither was there any mention made of the purpose for which the ethiops mineral was required. The powders were taken by the schoolmaster to the house of the deceased, who on the following day mixed as much of the supposed "ethiops mineral" as would cover a shilling, with an equal quantity of the cream of tartar, in some treacle, and swallowed the dose. He was soon afterwards seized with violent vomiting and purging, under which he finally sank, and died on the 18th of January. It was proved that the prescription, which was in pencil, on a dirty bit of paper, was written by a farrier for the deceased. It appeared that the prisoner had made a deposition before the Coroner in which he stated that the schoolmaster asked for *ethiops mineral*, but he gave him *turpeth mineral*, because he said he wanted it for dogs; and this statement, although contradicted by the schoolmaster, was confirmed by another witness.

Mr. Baron Channell, in summing up the evidence, left it to the jury to say whether the prisoner gave the schoolmaster to understand it was dog-medicine, or whether there was such gross negligence on his part as to render him guilty of the crime of manslaughter. The jury returned a verdict of *Not Guilty*.

TO CORRESPONDENTS.

Tasteless Pills.—To the Editor of the 'Pharmaceutical Journal.'

Sir,—Mr. Furley's process for rendering pills tasteless, was provisionally patented April 15, 1861. The patent has been *abandoned*, and is therefore now public property. How can Mr. Furley caution against infringing, and threaten an organized system of detection, when he has *no patent?* Yours, etc.,

37, *Princes Street, Edinburgh.* THOMAS DAVISON.

A Would-be Apprentice (Oldham).—*Classical Examination.*—"Candidates for registration as apprentices or students in Pharmacy are examined in the following subjects:—Latin—translation of a passage from the first book of Cæsar's Commentaries, *De Bello Gallico*; Latin Grammar; English Grammar and Composition; the first four rules of Arithmetic, simple and compound; vulgar fractions, and decimals. No candidate shall be admitted to this examination until he has completed his fifteenth year, and shall have given to the Secretary a notice of his intention to present himself for examination, together with a certificate of age and the fee of two guineas, one week prior to the day of examination. If the candidate fail to pass, the examination fee shall not be returned to him, but he shall be admitted, on giving the required notice, to any subsequent examination without further payment. The Middle Class Examination of Oxford, Cambridge, or Durham, and the Examination of the College of Preceptors, including Latin as one of the subjects, are accepted on behalf of Registered Apprentices or Students in Pharmacy, in lieu of the examination by the Board of Examiners in Bloomsbury Square."

Morgan (Southampton).—You have no annual subscription to pay; for further particulars apply to the Secretary, 17, Bloomsbury Square.

If *M. B. Cantab.* would devote one month to the Laboratory in Bloomsbury Square, he would gain all the practical information he requires; we know of no better work on the subject than the one alluded to.

Querist (Clifton).—Chloric ether; see Mr. Tate's communication, page 533. A formula for preparing chloric ether, miscible with water in all proportions, would be very desirable, and we hope to have such a formula in the forthcoming Pharmacopœia.

J. N. O. (Epsom).—The show-card referred to would render the article liable to the patent medicine stamp duty.

American (Kidsgrove).—The label would render the pills liable to stamp duty.

J. A. C. (Uxbridge).—*The Medicine Stamp and License Acts.*—The conditions which bring medicines under the operation of the Medicine Stamp and License Acts have been repeatedly referred to in this Journal; a recapitulation of these conditions will be found in our 14th volume, p. 146.

A Country Member.—"Cooley's Practical Receipts" will afford the requisite information.

L. O.—Persian Insect Powder.

V. N.—*Pulvis Bismuthi Compositus*, Vol. XVI., page 200.

X. Y. Z. (Berwick).—Ure's 'Dictionary of Arts, Manufactures, and Mines.'

L. M. N. (Doncaster).—The articles will not admit of comparison.

M. P. S. (Ipswich).—(1) *Tinctura Ferri Perchloridi* and *Tinctura Ferri Sesquichloridi* are identical. (2) "Lankester on the Microscope." (3) We are informed that the new Pharmacopœia will not appear before the latter part of the year.

H. B. E. (Bristol).—We know of no means of preventing the separation alluded to.

An Apprentice (Liverpool).—Fownes's 'Chemistry,' and Bentley's 'Manual of Botany.'

Pro Bono Publico.—There have been several meetings of the Committee, but they have not yet been reported.

H. F.—The communication is more suited for a medical publication than for this Journal.

ERRATA.—*Notices to Correspondents*, page 488.—For No. 6, Vol. I. (Second Series), *read* No. 7, Vol. I. (Second Series). Page 444, line 5, for Howes Thomas Manning, *read* Howes *John* Manning.

Instructions from Members and Associates respecting the transmission of the Journal, before the 25th of the month, to the Secretary, ELIAS BREMRIDGE, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. CHURCHILL, New Burlington Street. Other communications to the Editors, 17, Bloomsbury Square.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. III.—No. XI.—MAY 1st, 1862.

QUALIFICATION FOR APPOINTMENT AS DISPENSER IN THE ARMY.

In our last number we alluded to the Regulations adopted by the Army Medical Board, relating to the appointment of Dispensers in the Army, and we have since received several applications for further information on this subject. While attempts are being made by some parties to show that the doctrines of free-trade should be applied to the sale of physic, and that the tendency of modern legislation and the expressed opinion of men of high authority on such matters, are in favour of free-trade doctrines, it is not unimportant to observe how far these representations accord with the practice introduced in those departments immediately under the control of the Government. We have already expressed our belief that not only among members of the medical profession, but also in the Legislature, and among the public at large, the opinion is becoming stronger and more general, that for the satisfactory advancement of medical science, and the efficient protection of the public in the administration of medicine, it is essential that those who are engaged in the practice of Pharmacy should be fully qualified for the duties they have to perform, and that uneducated and ignorant persons should not be allowed to assume a position of great responsibility by the assumption of a name and emblems implying qualification. So greatly at variance with fact is the representation that the examination test of qualification is discredited or disregarded by those who influence public opinion, that it is only necessary to refer to what has been taking place during the last few years, and is now the established practice with reference to Government and other public appointments, to prove that free-trade in the sense of a license for incompetency is neither advocated nor sanctioned, but, on the contrary, that qualification as tested by examination is the ground upon which alone a claim to public confidence can be successfully urged.

If this be the principle adopted in making appointments in public offices, how much stronger is its claim to recognition in the regulations required for

the performance of duties so important as those connected with the sale of poisons and the administration of medicines!

It has long been an opprobrium to the state of Pharmacy in this country that any man, however ignorant and incompetent, might engage in the business of a Chemist and Druggist, and as such undertake to deal with and dispense the drugs and preparations, often powerful and sometimes dangerous when ignorantly or incautiously used, upon the skilful preparation and judicious employment of which the efficacy of medical science is dependent. It was to remedy, as far as possible, the effects of this acknowledged evil, by providing a class of qualified men in whom the public could place confidence, that the Pharmaceutical Society was established. The Certificate granted upon examination by this Society, is a guarantee to the public that the possessor is well educated and qualified for the duties of a Pharmaceutical Chemist. This certificate is not yet rendered essential as a license for carrying on the business of a Chemist and Druggist, but the value attached to it by those who have the management of medical affairs under the Government, may be estimated from the following notification of the regulations now adopted in the appointment of Dispensers in the Army. The letter, of which this is a copy, was addressed by the Director-General of the Army Medical Department to a candidate for such appointment:—

"Army Medical Department,
"9th January, 1862.

"Sir,—In acknowledging the receipt of your letter of the 2nd instant, I have the honour to inform you that no gentleman can be appointed to a Dispensership in the Army whose age is more than twenty-six or less than twenty-one years; and no name can be placed on the list of candidates until the applicant produces evidence of bearing a good moral character, of having passed the examinations of the Pharmaceutical Society of London, and of having been duly registered as a Pharmaceutical Chemist.

"I have the honour to be, Sir,
"Your most obedient humble Servant,
"*To Mr.*—— "J. H. Gibson, *Director-General.*"

PHARMACY AT THE INTERNATIONAL EXHIBITION.

We cannot at present describe the extent to which pharmacy will be represented at the International Exhibition, but from the preparations in progress it appears probable that there will be at least a creditable exhibition of drugs and preparations used in medicine. The collection which has been made under the auspices of the Pharmaceutical Society, containing all the principal medicines used in this country, will serve to illustrate the existing state of British pharmacy, and will be especially interesting to foreigners. It is, however, much to be regretted that the original object with reference to this collection could not be carried out, of including all the preparations to be described in the forthcoming British Pharmacopœia. The delay that has occurred in completing that work has rendered the accomplishment of such an object impossible.

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

MEETING OF COUNCIL, *2nd April*, 1862.

Present—Messrs. Bird, Bottle, Bucklce, Deane, Edwards, Evans, Haselden, Hills, Lescher, Meggeson, Morson, Sandford, Savage, Squire, Standring, and Waugh.

SPECIAL MEETING OF COUNCIL.—*16th April.*

Present—Messrs. Bucklee, Haselden, Herring, Hills, Morson, Sandford, Squire, and Waugh.

MAJOR EXAMINATION, *15th April.*

Argles, Robert	Clapham.
Knights, John Atmore	Norwich.
Pearson, Henry Jackson	Louth.
Sampson, Robert George	London.
Watkinson, Thomas James	Tenby.
Willsher, Stephen Henry	Tenterden.

MINOR EXAMINATION.

Bailey, John Bassatt	Reading.
Davenport, John Metcalfe	London.
Payne, Sidney	Stratford-on-Avon.
Preston, Joseph Classon	London.
Rose, Alfred	London.
Ward, Joseph	Nuneaton.

REGISTERED APPRENTICES.

NAME.	RESIDING WITH	ADDRESS.
Beilby, Michael	Messrs. Goode & Son	Congleton.
Bishop, Wm. Middlebrook	Mr. Bird	Worcester.
Brownen, George	Mr. Sharp	Christchurch.
Cherrington, Arthur Orlando	Mr. Thomas	Boston.
Emerson, John	Mr. Emerson	Hartlepool.
Kent, William Ramsey	Mr. Kent	London.
Padwick, John	Mr. Sharp	Christchurch.
Poore, James Evans	Mr. Brew	Brighton.
Samuel, James Burck	Mr. Herington	Leighton-Buzzard.
Thurston, Frederick	Messrs. Grimwade, Ridley, & Co.	Ipswich.
Wilkinson, James	Mr. Bartlett	London.

PHARMACEUTICAL MEETING.

Wednesday, April 2nd, 1862.

MR. PETER SQUIRE, PRESIDENT, IN THE CHAIR.

The following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced, and the thanks of the Society given to the respective donors:—

The Technologist.
The Dental Review.
The British Journal of Dental Science.
The Chemical News.
The Chemist and Druggist.
The Educational Times.
The Photographic Journal. From the respective Editors.
Journal of the Chemical Society.
The Journal of the Society of Arts.
The Répertoire de Chimie. From the respective Societies.
Illustrations of the Nueva Quinologia of Pavon. By J. E. Howard, Esq. Part 10. From the Author.
Notes on Chinese Materia Medica. By Daniel Hanbury, Esq. From the Author.
Four Specimens of American Rock Oil. From Mr. Robert Palmer.
Specimens of Hydrastine and Nitrate of Berberine. From Mr. Perrins.
Diseased Wheat (*Vibrio tritici*). From Mr. Deane.
Legumes of *Abrus precatorius*. From Mr. Deane.

The following Papers were read:—

NEW AMERICAN REMEDIES.

BY PROFESSOR BENTLEY, F.L.S., M.R.C.S. ENG.,

[(*Continued from page* 464.)

HYDRASTIS CANADENSIS, LINN.—YELLOW ROOT, ORANGE ROOT.

HISTORY.—We know but little of the history of this plant. It is said to have been in use from the earliest periods of time by the Indians, in the Western States of North America, both as a medicine and as a dyeing agent. For many years it has been in much repute, more especially as a tonic, by the class of Eclectics in North America. It has been lately used to some extent by the regular medical practitioners of that country in affections of the mucous membranes, etc., and is now on its trial as a remedial agent in this country.

SYNONYMS.—This plant is the *Hydrastis canadensis*, Linn., and of most other authors; the *Warneria canadensis*, Mill. The generic name has been probably derived from ὑδωρ, water, from the plant growing in moist places; or, according to others, from ὑδωρ, water, and αγω, to act, from its peculiar action on mucous membranes. It has received a variety of common names, as *Orange root, Yellow root, Yellow Puccoon, Golden Seal, Turmeric root*, etc., all of which have been evidently derived from the yellow or orange colour of its rhizome and rootlets. It is also sometimes known as the *Ground Raspberry*,—a name which has been applied to it, from the resemblance its fruit bears to that of the unripe raspberry. The name of

Yellow Puccoon has, in some instances, led to its having been confounded with the *Puccoon* or *Blood root*. The latter should be carefully distinguished from it, as it is a totally different plant—the *Sanguinaria canadensis*, Linn., belonging to the natural order Papaveraceæ.

Botany.—*Hydrastis canadensis* belongs to the natural order Ranunculaceæ of Jussieu, De Candolle, and other botanists; and to the tribe Anemoneæ of De Candolle.

Generic Character.—*Calyx* with three ovate sepals. *Petals* none. *Stamens* and *carpels* numerous. *Achenia* baccate, numerous, collected together into a head. *Style* terminal. *Carpels* one-celled, 1–2-seeded. *Seeds* obovate, smooth.—*DC.*

Specific Character.—This is the only known species of Hydrastis. The *rhizome* is perennial, twisted, knotted, and of a bright yellow colour, with numerous long rootlets. From this rhizome arises a simple aerial herbaceous stem, which is hairy above: and bearing two unequal leaves, the lower one of which is petiolate, and the other sessile; and a solitary terminal flower. The *stem* varies in height from 6 to 12 inches. The *leaves* are more or less rounded, palmate, cordate at the base, 3–7-lobed; each lobe being biserrate or inciso-serrate. The *flower* is solitary, greenish-white or somewhat rose-coloured, with but one floral envelope, formed of three ovate deciduous sepals. The *fruit* is of a red or crimson colour, somewhat resembling an unripe raspberry; and formed of about a dozen fleshy, obovate achenia, which together constitute an etærio. Each achenium is terminated by a persistent, recurved style, and contains one or two shining, black, smooth seeds.*

Habitat.—*Hydrastis canadensis* is only indigenous in North America. It is rarely distributed in the various districts of the northern parts of North America, but it is especially abundant beyond the Alleghanies. It flowers in April and May, the sepals falling off soon after their appearance.

General Characteristics.—The part used in medicine and for other purposes, is commonly termed a root, but properly it is the rhizome with its attached rootlets. In commercial specimens, the rootlets are found partly attached to the rhizomes, and partly, lying detached and mixed with them.

The *rhizome* is generally simple, although very rarely it is branched. In length, it varies from about half an inch to an inch and a half, or even in some cases, more. The average length is about an inch. It varies in thickness from one-twelfth to half an inch; averaging about one-fourth of an inch. The rhizome is variously twisted and knotted, by which it acquires a very irregular form and appearance. The upper surface presents several irregularly rounded projections, terminated by scars produced by the decay of former aerial stems. In some instances, a portion of the aerial stem may be found attached to the rhizome. The external surface is marked by slight longitudinal furrows and corresponding projections, and by evident annular scars. From the lower surface of the rhizome principally, but also, in part, from the sides and upper surface, numerous, small, more or less twisted rootlets arise, or when these are absent, their position is marked by yellowish projecting scars. It has a yellowish-brown colour, which becomes darker by keeping. When fresh, it has a well-marked narcotic odour, which is lost in a great measure by age, when it acquires a peculiar odour, which reminds me in some degree of liquorice root. It has a very bitter and somewhat opiate taste; more especially so, when freshly dried. The fracture is close and resinous-like. A transverse section of the recently dried rhizome presents a central

* A good figure of this plant in flower may be found in 'Curtis's Botanical Magazine,' vol. lvii. tab. 3019; and one of the fruit, leaves, and rhizome, in vol. lx. tab. 3232 of the same work.

bright yellow portion, surrounded by a darker-coloured zone, which is formed principally of radiating woody plates; and on the outside of this a yellow cortical portion will be noticed. In old dried rhizomes, the colour varies from yellow to dark brown.

The *rootlets* vary in length, being sometimes as much as two, three, or more inches. Their average size is about that of a common needle. Externally they present a yellowish-brown colour, are more or less twisted, and smooth or marked by irregular longitudinal striæ. Their fracture is close. In taste and odour they resemble the rhizome. Internally they present a bright yellow colour, which darkens by age to some shade of brown. A transverse section exhibits a small central meditullium, surrounded by a yellow cortical portion.

Composition and Chemical Characteristics.—An infusion of Hydrastis, made by macerating one ounce of the mixed rhizomes and rootlets as found in commerce, in twenty-four ounces of boiling water, for twenty-four hours, presented a reddish-yellow colour, a very bitter and somewhat opiate taste, and a narcotic peculiar odour. It exhibited the following reactions:—*Blue Litmus-paper* was slightly reddened by it; *Solution of Diacetate of Lead* produced an abundant dirty yellowish-brown precipitate; *Solutions of the Perchloride* and *Persulphate of Iron* a faint blackish-brown colour, and ultimately a very slight precipitate; *Tincture of Iodine* caused a dirty yellowish-brown colour and abundant precipitate; *Solution of Sulphate of Copper* at first lessened the colour of the infusion, which soon became turbid, and ultimately deposited a slight granular brown precipitate; *Solution of Chloride of Barium* produced a plentiful, yellowish-white, light precipitate; *Solution of Gelatine*, a very slight precipitate; *Infusion of Galls*, a plentiful precipitate; *Solution of Tartar Emetic* at first produced no very marked change in the infusion, but after some time it caused an abundant precipitate. No very evident effects were caused by the addition of the *concentrated sulphuric* or *hydrochloric acids* to the infusion; nor by *solution of ammonia*. *Concentrated nitric acid* produced no immediate change in the infusion, but ultimately, a yellowish-white precipitate was formed.

The application of sulphuric and hydrochloric acids to a clean section of the rhizome and rootlets produced no marked effects; but upon the addition of nitric acid, the whole surface assumed a reddish colour. No evident change was caused by putting solution of ammonia in contact with a section of the rhizome or rootlets.

Two analyses of the rhizome have been published, one by Durand and the other by Tilden. The analysis of Durand* shows that it contains *albumen, starch, gallic acid, fatty matter, dry acrid resin, yellow colouring matter, extractive matter, sugar, a peculiar nitrogenous crystalline substance*, which he suspected to be a new alkaloid, and to which he gave the provisional name of *hydrastin; potassa, iron, magnesia, alumina*, probably in the state of a phosphate, and *carbonate* of lime. Durand was led by his investigations to believe that Hydrastis contained no tannic acid; but the reactions which I have already noticed above, indicate the presence of both tannic and gallic acids in small proportions. The analysis of Tilden† is as follows:—

Organic matter	89·168
Inorganic matter	10·832
Total	100·000

* Amer. Journ. Pharm. vol. xxiii. p. 112; and Wood and Bache's 'United States Dispensatory,' 11th edition, p. 1425.

† Lee, in Amer. Journ. of Mat. Med. vol. ii. p. 126.

Gum	6·05
Albumen	5·22
Starch	5·04
Extractive	3·57
Sugar	7·23
Fixed oil	2·88
Colouring matter, or yellow bitter extractive	7·65
Particular matter	4·42
Resin	2·77
Soluble salts	2·53
Insoluble salts	2·30
Lignin, etc.	50·34
	100·00

The *hydrastin* as provisionally named by Durand* may be prepared by dissolving the aqueous extract of Hydrastis in water, then adding magnesia, and extracting the precipitate then produced by boiling alcohol; and afterwards allowing the solution to evaporate spontaneously, when beautiful yellow four-sided crystals with pyramidal summits will be obtained. To these the name of *hydrastin*, or, in accordance with the ordinary nomenclature for alkaloids in use in America—*hydrastia*, has been given. The characteristics of hydrastia, as given by Parrish† (which appears to be the same alkaloid noticed by Durand), are as follows:—"Brilliant yellow crystals, insoluble in water, sparingly soluble in cold alcohol and ether, soluble in chloroform and boiling alcohol, fusible in heated turpentine; it has an alkaline reaction on litmus; by concentrated nitric acid it is coloured deep red; concentrated sulphuric acid has little action when cold, but when heated a purple colour is produced; concentrated muriatic acid dissolves it. The salts, which are intensely bitter, have not been obtained in crystals."‡

Besides the above alkaloid, there are three other concentrated medicines in use by the Eclectics, etc. under the names of *hydrastine* or *hydrastin*, by which great confusion is occasioned; one of these is described as a resinoid, one as a resin, and the third as neutral. The resin, resinoid, and neutral substance are commonly known in America as *hydrastin*, and the alkaloid as *hydrastine*, *hydrastia*, or *hydrastina*. The characteristics of the alkaloid *hydrastina*, as given by Lee§ and some other American writers, differ in some important respects from those mentioned above by Parrish as those of *hydrastia*. Hence it is evident that even the alkaloids in use in America are not identical.

A specimen of *hydrastin*, in the museum of the Pharmaceutical Society, which was obtained from America, is in beautiful yellow, somewhat translucent, silky, acicular crystals, which have a very faint narcotic odour, and an intensely bitter taste. They are nearly insoluble in cold water, alcohol, ether, and chloroform; but readily soluble in boiling water; and the solution thus obtained has an alkaline reaction on both litmus and turmeric-papers. The colour of the solution is bright yellow, both when hot and in a cold condition. Concentrated nitric acid dissolves it with the disengagement of nitrous acid gas, and forms a deep red solution. Concentrated sulphuric acid also dissolves it, and forms a deep olive-brown solution. When the solution of hydrastin in water is boiled with a solution of caustic potash, it becomes turbid, and deposits brown resinous-looking particles upon the sides and

* Amer. Journ. Pharm. vol. xxiii. p. 115.

† 'Introduction to Practical Pharmacy,' 2nd edit., p. 394.

‡ For further particulars of *hydrastia* or *hydrastine*, see Mr. Perrins' paper in the present number of the Journal, p. 546.

§ Amer. Jour. Mat. Med., vol. ii. p. 126.

bottom of the test-tube; during the boiling no smell of ammonia is to be detected. In its reactions and general characteristics, this specimen of hydrastin seems to correspond nearly, but not altogether, with the hydrastin described by Parrish,* the mode of preparation of which is thus described by Professor Wayne:—"Treat the powdered root of *Hydrastis canadensis* by displacement with cold water; then acidulate the infusion with hydrochloric acid, which precipitates hydrastin and a gelatinous substance; collect the precipitate on a filter, and wash with clean water; then dry it, dissolve the dried mass in alcohol, filter, and set aside to crystallize." This is the hydrastin in common use by the Eclectics, etc.

Dr. Mahla, of Chicago, United States, has recently made the interesting discovery that the hydrastin as thus prepared, is in reality impure *berberine*.† The chemical reactions of the specimen of hydrastin in the Society's museum, as alluded to above, which I have carefully examined since reading Dr. Mahla's paper, also correspond, as may be seen, in most particulars, with *berberine*. The presence of berberine in *Hydrastis canadensis* is therefore clearly ascertained; and its discovery in this plant by Dr. Mahla, is a most interesting one, for hitherto berberine had not been known to exist in any plant of the Ranunculaceæ. *Berberine* has now been found in plants belonging to no less than four natural orders; that is, in *Berberis vulgaris (Berberidaceæ); Cocculus palmatus* or *Jateorhiza palmata*, and *Coscinium* or *Menispermum fenestratum*‡ of the *Menispermaceæ;* in *Cœlocline* or *Unona polycarpa*, of the *Anonaceæ;* and in *Hydrastis canadensis (Ranunculaceæ)* as just noticed.§

In referring to Dr. Mahla's paper, Professor Procter‖ says, "It is to be regretted that Dr. Mahla did not consult the paper of Mr. Alfred B. Durand,¶ and adds, "I have a sample of Mr. Durand's hydrastin, and it is not berberin, but crystallizes in light yellowish crystals of considerable size. The yellow colouring matter alluded to by Durand** is probably berberin." Mr. Merrill also, of Cincinnati, says that the alkaloid described by Mr. Durand is quite distinct from the yellow crystalline hydrastin as used by the Eclectics.†† It seems, therefore, that the *Hydrastis canadensis* not only contains the alkaloid *berberine*, but also the peculiar alkaloid, *hydrastia* or *hydrastine*, as has been already noticed. Further experiments are however desirable, before we can be said to have an altogether satisfactory knowledge of the principles contained in *Hydrastis canadensis*. I may add, that so far as I have had an opportunity of examining the different kinds of hydrastin, etc., I am also of opinion, that berberine is associated with a peculiar principle (*hydrastine*) in the *Hydrastis canadensis*.‡‡

Medicinal Properties and Uses.—The various preparations of *Hydrastis canadensis* are said to possess to a greater or less extent tonic properties, and to exercise an especial influence over mucous surfaces. They are also reputed "to be particularly beneficial during convalescence from exhausting diseases." According to Lee,§§ "Hydrastis acts upon the hepatic function as a cholagogue,

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* 'Practical Pharmacy,' 2nd edit., p. 193.

† Silliman's Amer. Journ. Science and Arts, January, 1862; and Amer. Journ. Pharm., vol. xxxiv. p. 104.

‡ Perrins, in Pharm. Journ., vol. xii. p. 188.

§ In the present number of the Journal (see p. 567) Mr. Perrins has also announced the discovery of *Berberine* in *Xanthorrhiza apiifolia*, another plant of the Ranunculaceæ.

‖ Amer. Journ. of Pharm., vol. xxxiv. p. 144.

¶ Amer. Journ. of Pharm., vol. xxiii. p. 112.

** Durand, as before, p. 114.

†† Amer. Journ. of Pharm., vol. xxxiv. p. 144.

‡‡ Mr. Perrins' paper in the present number of the Journal, page 546, completely proves the existence of both *berberine* and *hydrastine* in *Hydrastis canadensis*.

§§ Amer. Journ. Mat. Med., vol. ii. p. 127.

and upon the glandular system generally as a deobstruent. It must be remarked however, (he says), that the resinoid extract, hydrastin, obtained by the solvent action of alcohol, differs essentially in its effects from the alkaloid hydrastina, proving highly irritating and stimulating, while the latter acts chiefly as a simple bitter only. In inflammatory or irritable conditions of the gastro-enteritic surfaces, the former preparation will therefore be found objectionable. The resinoid, indeed, has been considered so powerfully irritating as to be recommended by some botanic physicians as an escharotic." Dr. Grover Coe says,* "that hydrastin possesses laxative, cholagogue, alterative, resolvent, tonic, diuretic, antiseptic, and other properties, and that it may be employed with success in leucorrhœa, gonorrhœa, gleet, cystitis, fevers, dyspepsia, piles, constipation, ophthalmia, otorrhœa, catarrh, and all diseases involving the mucous surfaces." The author of 'Positive Medical Agents' states, that as an anti-periodic it is without an equal in the Materia Medica, if we except sulphate of quina.

Besides the use of hydrastis as a medicinal agent, it has been employed from time immemorial by the Indians of the Western States of North America,† as a dye. Mr. Durand states that "it imparts to linen a rich and durable light yellow colour of great brilliancy, which might probably by proper mordants give all the shades of that colour, from the pale yellow to the orange. The lake produced by the bichloride of tin might also prove a useful pigment in oil and water-painting."

Administration, Doses, and Preparations.—Hydrastis has been administered in powder, and in the form of infusion, decoction, tincture, extract, etc.; or more frequently, its resinoid and alkaloid have been employed as substitutes for these preparations. The dose of hydrastin will necessarily vary according to the kind mentioned. The average dose is about two grains. The dose of hydrastin (resinoid) is from one-half to five grains; and that of hydrastina (alkaloid), from about one to six grains.

In leucorrhœa, when the secretions are acrid and offensive, Dr. Coe recommends the following combinations:—Take Hydrastin, ℈j; Super-carbonate of Soda, ʒj. Mix. Dose from four to eight grains three times a day. He also recommends the same mixture in indigestion, accompanied with acidity, flatulence, etc., and in ulceration of the mucous membrane of the bowels.‡ For topical use in ophthalmia, catarrh, eczema, ulcers, etc., and as an injection in gonorrhœa, leucorrhœa, etc., from one to two drachms should be infused in sixteen ounces of boiling water, and allowed to stand till cold, when the clear solution should be poured off the resinoid deposit which will then be noticed.

At present there are no published formulæ for either infusion, decoction, extract, tincture, etc., of hydrastis. If hydrastis should come into demand as a medicinal agent in this country, it would be very desirable that some formula should be proposed and generally adopted. This is the more necessary from the fact of four distinct concentrated remedies being in use, under nearly similar names, and of which but little is definitely known; and hence the medical practitioner must necessarily experience much difficulty in distinguishing between them, and prescribing with any degree of certainty. The best preparation of hydrastis would probably be an hydro-alcoholic extract, as it would possess in an eminent degree all the active properties of the rhizome and rootlets; and if a definite formula were agreed to, the present uncertainty which attends the administration of the preparations of hydrastis,

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* 'Concentrated Organic Medicines,' p. 360.

† Amer. Journ. Pharm., vol. xxiii. p. 119.

‡ Grover Coe 'On Concentrated Organic Remedies,' p. 361.

would be at once remedied. Till some recognised formulæ have been adopted, to avoid confusion from the various concentrated remedies, I would recommend the employment of the extracts of hydrastis as imported from North America.

ON HYDRASTINE, AN ALKALOID OCCURRING IN *HYDRASTIS CANADENSIS*.

BY J. DYSON PERRINS, F.C.S.

The substance hitherto known as Hydrastin in the Eclectic school of American pharmacy proves to be little more than impure Berberine; it therefore appears to me that the term *Hydrastine* may with great propriety be transferred to another alkaloid, which I have recently observed in *H. canadensis*. I have been acquainted with the occurrence of Berberine in this plant for some time past. It was observed in pursuing an inquiry which is still incomplete, and therefore has not yet been published. Dr. Mahla, of Chicago, to whom priority of publication is due, has announced this source for Berberine in 'Silliman's Journal,' for January, 1862. I can entirely corroborate his conclusions, and add, that Hydrastis proves to be an excellent source for Berberine. I have obtained from it four per cent. of the crude muriate.

To obtain the new alkaloid, it is advantageous to bear in mind that berberine is difficultly soluble in the dilute mineral acids, especially in dilute nitric acid, and that hydrastine, readily soluble in acids, is insoluble in alkaline solutions; to prepare it, the mother liquor, largely diluted after the separation of the berberine, may be used: this should be rendered as free as possible from alcohol, and solution of ammonia cautiously added until a precipitate *just begins* to appear and remains constant upon stirring; this consists principally of dark-coloured resin, previously held in solution by the excess of acid; then filter, and to the filtrate add a slight excess of ammonia; the hydrastine now falls as a fawn-coloured precipitate, which should be collected and washed with cold water. Under the microscope it now presents the appearance of spherical granules, very like wheat-starch. I have observed that this precipitate when pressed between porous tiles, and put aside for a few hours, undergoes a remarkable molecular change, becoming decidedly crystalline; to purify the substance, dissolve with heat in alcohol of eighty per cent., or perhaps preferably in proof spirit, and filter while hot: upon standing for a few days, the greater part of the alkaloid will crystallize out, more or less coloured; to render it quite pure, repeat this treatment with the addition of a little animal charcoal until the crystals are colourless. They are now four-sided prisms, and of great brilliancy, but they lose this transparency after they are dried. The yield is about 1·5 per cent. of the dried root operated on.

Hydrastine contains nitrogen, and appears to be a powerful organic base, combining perfectly with acids, and forming the usual double salts with mercury, gold, and platinum. Hydrastine is nearly insoluble in water, but readily soluble in alcohol, ether, chloroform, and benzole; indeed, it may be obtained by treating the powdered root in a displacement apparatus with either of the three latter solvents, which are without action upon berberine.

The greater part of the salts of hydrastine appear to be readily soluble in water; so far as I have observed, the phosphate and the iodate are the least so: the carbazotate is not very soluble in proof spirit, and it may be easily obtained in radiating groups of yellow silky needles, often arranged after the manner of wavellite.

Hydrastine melts to a clear colourless resin at a few degrees above 212° Fahr.

Hydrastine, and especially its soluble salts, have a bitter and acrid taste, followed by a sense of numbness, which is not severe, but nevertheless is well marked; whatever the physiological effects of this alkaloid may prove to be, it cannot, I think, be classed amongst the poisons, as five grains given in solution to a full-grown rabbit produced no other effect than a slight uneasiness, which passed off in the course of an hour or two.

Crystals of hydrastine touched with concentrated nitric acid merely give rise to a yellow-brown coloration, which is not very noteworthy, but with sulphuric acid and an oxidizing agent the result is different; with sulphuric acid and bichromate of potash, or peroxide of lead, a coloration is produced varying from a brick-red to a light but pure crimson, certainly distinct from the deep purple yielded by a crystal of strychnine, but so nearly allied to the tints sometimes obtained from mere *traces* of strychnine as to render it desirable that this colour test should be remarked upon.*

The degree of attention just now bestowed upon the American remedies of the Eclectics, is my apology for noticing this alkaloid in the incomplete manner which I have here ventured to do, before I have had sufficient opportunity of studying its composition, or of presenting a formula for the acceptance of chemists. Still, as supplementing the paper of Professor Bentley upon *Hydrastis canadensis*, I hope this notice may not be without interest even in its present form.

Worcester, March 12th, 1862.

[Since transmitting the foregoing paper to the Pharmaceutical Society, I have had, through the kindness of Professor Bentley, an opportunity of seeing an essay on *Hydrastis canadensis*, by Durand, which appeared in the American 'Journal of Pharmacy,' vol. xxiii. p. 112, (1851.) Durand's examination of this root is not very satisfactory. He appears to have overlooked the presence of berberi ne altogether, but seems to have obtained crystals, which were probably hydras tine, and noted some few of their properties; yet he says he is in doubt as to their nature, his experiments not being sufficiently conclusive to enable him to pronounce thereon. I was not aware there had been any previous notice of this substance until my attention was called to Durand's Essay by Professor Bentley, and it is remarkable that so promising a body should not have been further examined, during a period of more than ten years.—J. D. P.]

Professor Bentley remarked, that the above communication of Mr. Perrins was one of much interest, for although he had not first discovered the alkaloid *hydrastine*, as he had supposed, being unacquainted with Mr. Durand's previous announcement of its discovery in the 'American Journal of Pharmacy'; yet he had discovered it quite independently, and by his more complete and careful examination of its nature and characteristics, he had rendered clear much that had been hitherto obscure and unsatisfactory with regard to it. The presence of Berberine in *Hydrastis canadensis* had also, as it appeared by Mr. Perrins' paper, been known to him for a considerable time.

Mr. Perrins then announced to the meeting, that he had recently discovered Berberine in *Xanthorrhiza apiifolia*, another Ranunculaceous plant. He would, he said, send a paper upon this subject during the present month for publication in the 'Pharmaceutical Journal.' (See present number, p. 567.)

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* The addition of chlorine water to solutions of hydrastine salts, gives rise to an appearance of blue fluorescence, comparable to that seen in acid solutions of quinine.

ON THE PREPARATION OF IODIDE OF POTASSIUM, AND SOME OTHER IODIDES.

BY W. STEVENS SQUIRE, PH.D., F.C.S.

I propose to bring under your notice this evening a beautiful process for the preparation of iodide of potassium, which has lately been devised by Baron Liebig, and I shall take this opportunity of making some practical remarks upon this process, and on some other points connected with the iodides employed in medicine.

Of the many processes which have been recommended for the preparation of iodide of potassium, I believe only three have been found at all practical:—1. A solution of iodide of iron or zinc is decomposed by a solution of carbonate of potassium. 2. Iodine is added to a warm solution of hydrate of potassium; the colour disappears with the formation of iodide and iodate of potassium, the solution is evaporated to dryness, and heated with charcoal, which reduces the iodate to iodide. 3. Iodine is added to a solution of sulphide of barium; in this case sulphur is precipitated, and iodide of barium is formed. This solution is boiled with powdered sulphate of potassium; iodide of potassium then remains in solution, and may be filtered from the insoluble sulphate of barium. This last process has the great disadvantage that the product is rarely, if ever, free from sulphur compounds, and is rather inclined to blacken when heated; in other respects it is a beautiful preparation, and is very free from sulphates, chlorides, and other impurities generally found in iodide of potassium. In the first two processes purified pearl-ashes are used instead of pure carbonate of potassium, which is too expensive for the purpose. In this way the various impurities of the potashes find their way into the iodide of potassium, or the mother-liquors must be rejected, and the iodine recovered from them, which is not found to be an economical plan.

In order to meet these objections, Baron Liebig has proposed the following mode of preparation:—1 part of phosphorus is placed in a basin, and covered with about 40 parts of hot water, and 20 parts of iodine are gradually added, with frequent stirring; violent action takes place, and a great portion of the phosphorus is converted into the amorphous variety, which however in no way interferes with the process, as the amorphous phosphorus reduces the iodine just as well, though not quite so fast. The colourless liquid, which consists of a solution of phosphoric and hydriodic acids,

$$P + 5I + 4H_2O = H_3PO_4 + 5HI,$$

is then poured off from any excess of phosphorus, and milk of lime is added until the mixture becomes alkaline; the whole is now brought upon a linen filter, and the precipitate, which consists of phosphate of calcium, is pressed and washed; the filtrate contains nothing but iodide of calcium, and is now to be boiled down with twelve parts of sulphate of potassium in powder (this quantity is not quite sufficient to decompose the iodide of calcium). When concentrated to about half, the whole is allowed to cool and remain at rest for six hours, and then filtered, the precipitate being pressed as before. A small quantity of PURE carbonate of potassium is then added to the filtrate, which removes every trace of lime, and the filtered solution now yields, on evaporation, crystals of pure iodide of potassium. A quantity of iodide of potassium, prepared in this way by Pettenkofer, yielded almost the theoretical quantity. By a modification of this process we may prepare the iodides of sodium, lithium, barium, strontium, calcium, magnesium, manganese, ammonium, etc. etc.

In repeating Liebig's experiments I find the iodides prepared in this way

very easily acquire a peculiar pinkish hue, and that it is very difficult to get them to crystallize properly; what the cause of this is, I do not know, but the objection is completely removed by fusing the salt before crystallization,—the iodides after this treatment crystallize beautifully, and retain their colour remarkably well. A specimen of iodide of ammonium prepared in this way, by fusing the iodide of barium, was found to have no superiority as an iodizer for photographic purposes; and this is perhaps the best test of its purity. With this slight modification, I think that the process of Baron Liebig is one of the best ever proposed for the manufacture of iodide of potassium; the potassium salt used is at once the cheapest and the purest, and the only other item of cost in the materials is the phosphorus, but one ounce of this body is sufficient for the production of one pound and a half of iodide of potassium, so that it only costs about one penny for every pound of iodide manufactured by this process.

Proto-iodide of Mercury.

The Pharmacopœia directs, for the preparation of this compound, that eight parts of mercury should be rubbed with five of iodine, with the addition of a little spirit; the powder thus produced is of a dull olive colour, and consists of pure iodide of mercury. There is found in commerce a powder of a beautiful brilliant yellow colour, which sails under the name of iodide of mercury, and which is often preferred to the pharmacopœial preparation, on account of the beauty of its colour. This brilliant powder is prepared by precipitation from the protonitrate of mercury, but, as this salt is insoluble unless a certain proportion of nitric acid is present, the free nitric acid so acts upon the iodide at the moment of its precipitation that the product is contaminated with a certain proportion of biniodide.

The presence of this last is conveniently proved by heating a sample of the yellow iodide with a little aniline, which possesses the property of producing the well-known magenta colour when treated with a persalt of mercury. The pharmacopœial preparation, if no excess of iodine has been used, does not exhibit this reaction. As the biniodide of mercury is so much more powerful in its action than the protiodide, the substitution of the yellow for the pharmacopœial preparation is highly objectionable and might be attended with danger.

Periodide of Iron.

It would have been hardly worth while to bring this subject under the notice of the society, if it were not according to the handbooks of chemistry still a moot point, whether the periodide of iron exists or not.

To determine this question, a quantity of iodine was divided into three parts; two of these were combined with iron so as to form a pale-green liquid, the third portion was then added and the whole boiled so as to promote combination. After the dark-brown solution had cooled, it was shaken up with about three times its volume of ether. In a little time the whole of the ether was found floating upon the water, and had carried with it the whole of the iodine, leaving the iodide of iron dissolved in the water, from which carbonate of ammonium threw down the white carbonate of iron. This experiment pretty conclusively proves what our President asserted in the 'Philosophical Magazine,' in July, 1836, viz. that the periodide of iron had no existence, and that the brown solution obtained by exposing a solution of iodide of iron to the air was nothing more than a solution of iodide of iron with some free iodine.

SPECIAL GENERAL MEETING FOR THE CONFIRMATION OF THE BYE-LAWS.

On Wednesday, the 16th of April, a Special General Meeting of the Members of the Pharmaceutical Society was held at the house of the Society at twelve o'clock; Mr. PETER SQUIRE, President, in the chair.

The PRESIDENT explained the object of the Meeting, which was to fulfil a pledge which had been given by the Council at the Special Meeting held on the 15th of January, that a further amendment should be made in the Bye-Laws then passed, to render the operation of the 1st Section more clear.

The SECRETARY read the notice which appeared in the last number of the 'Pharmaceutical Journal,' convening the meeting.

It was moved by Mr. SANDFORD, seconded by Mr. MORSON, and carried unanimously,—

> "That the code of Bye-Laws, which at the special general meeting of the Society, held on the 15th day of January last, was confirmed and approved as the Bye-Laws of the Society, be amended in Section 1 by the addition of the following words to Clause 5:—'and no other person whose name has not previously been inserted in the Register of Pharmaceutical Chemists, under Section 10 of the said Act, shall be elected a Member.'"

It was moved by Mr. SANDFORD, seconded by Mr. BOWDEN, and carried unanimously,—

> "That the said code be further amended in Section 1, Clause 12, by erasing the word 'March' and substituting for it the word 'October,' and by erasing the words 'Registration Fees' and substituting the words 'Examination Fees;' and also, in Clause 14, by inserting after the words 'all persons who' the words 'before the first day of October, 1862, shall have paid fees on and,' and by erasing the words 'before the first day of March, 1862.'"

It was moved by Mr. SANDFORD, seconded by Mr. BRETON, of Brighton, and carried unanimously,—

> "That the said code of Bye-Laws, as amended, be confirmed and approved as the Bye-Laws of the Society, and take effect from the date of confirmation thereof by one of Her Majesty's principal Secretaries of State, and that all other Bye-Laws of the Society be abrogated."

A vote of thanks having been passed to the Chairman, the meeting separated.

PHARMACEUTICAL MEETING, EDINBURGH.

The Fifth Scientific Meeting of the Session was held in George Street Hall on Thursday evening, 10th April, at nine o'clock; Mr. AINSLIE, President, in the chair.

The following paper was read by Dr. MURRAY THOMSON, F.C.S. and Lecturer on Chemistry in Edinburgh:—

HISTORICAL REMARKS ON THE EDINBURGH SCHOOL OF CHEMISTRY AND ITS TEACHERS.*

Though the attention of this Society has more than once been drawn to the past state of Pharmacy, yet it does not appear to me that its local history has been all worked

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* It should be noted that the following is only an abstract of my paper. It would have been out of place to have published it *in extenso*, as much of the general information contained is already well known, and a still greater portion, though now quite in the same condition, has only a local interest.

out; and this is the more remarkable, as the names of several men who have adorned the annals of science, appear to have been apothecaries in Edinburgh. Among these might be named Mackaille, Preston, and Murray, the two latter of whom distinguished themselves; one afterwards being the Professor of Botany in the University, and the other a well-known and able lecturer on Chemistry. However, I merely wish by these prefatory remarks to indicate this want in your historical records, my present object being to bring under your notice the chemists who have from time to time flourished in Edinburgh.

Chemistry was taught in Edinburgh earlier than anywhere else in Scotland. Its first teacher was Mr. Alexander Monteath, and the announcement of probably his first course is thus given in the 'Edinburgh Gazette,' for 8th May, 1699:—

"Upon Monday, the 1st June next, there will begin, in the Laboratory of the Chirurgeon Apothecaries' Hall, a course of *Chymic;* in which all the useful operations and preparations will be performed. The course will continue six weeks, and will be concluded by a short description of the whole Materia Medica.—Alexander Monteath, Chirurgeon Apothecary in Edinburgh."

The rooms where this early teacher convened his class a hundred and sixty-three years ago, may still be seen; they occupied the south-west angle of the old Surgeons' Hall, a building which is still an appendage of the Infirmary.

These courses of *Chymic* continued to be given annually for fourteen years after they were commenced, but they do not appear to have been always conducted by Monteath. In fact, the appointment of the teacher lay with the Incorporation of Chirurgeons; they taking the class under their own patronage and care.

In 1713 the Town Council moved in the matter of teaching chemistry, and appointed a Professor on the 9th of December of that year, in the person of Dr. James Crawford.* Strange to say it was Dr. Crawford himself who urged the foundation of the Chair of Chemistry, he having offered to do the duties connected therewith without asking any salary. The Town Council, anxious to extend the reputation of their University, embraced his offer, and assigned him two rooms for the purposes of his class.

After the foundation of the chair, till the end of the eighteenth century, we lose sight of the Chemistry teachers out of the University; and even within its walls the Professor does not seem to have met with such success as enabled him to lecture on uninterruptedly. That Dr. Crawford's energies were unemployed is evident from the fact, that in 1719 he was appointed Professor of Hebrew; the duties of which chair he discharged till 1732, six years after he had ceased to be Professor of Chemistry. It was in 1726 when he resigned the latter office, and his successor to it was Dr. Andrew Plummer. This same year the medical faculty was enlarged by the addition of three other professors besides Plummer; these were Drs. Rutherford, St. Clair, and Innes, who along with Dr. Plummer had been conducting a kind of semi-private school of medicine in the immediate neighbourhood of the College. The celebrity and merit of these men greatly increased the attendance at the medical classes of the University, so that annual courses of lectures on chemistry, as well as the other medical sciences, were now regularly delivered. Dr. Plummer did not lecture on pure chemistry, but included in his teaching Pharmacy and Materia Medica;† Dr. Plummer held the chair from 1726 till 1750, when he was succeeded by the celebrated Dr. Cullen; but before speaking of him, this seems the most appropriate place to give some general account of the state of chemistry as a science at that period, so that we may the better understand what doctrines were taught by its early professors in Edinburgh.

Those men could not have been tinctured with alchemical notions, for the able writings of Lord Bacon and of Boerhaave had made sad havoc with alchemical lore; and the influence of the latter especially was great in Edinburgh, as he was then one of the brightest ornaments of the University of Leyden, then a most famous school of medicine. Boerhaave had for his pupils Drs. Crawford and Plummer, perhaps also

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* The Chair of Chemistry in the University of Cambridge was founded the same year.

† He was the first to use the compound of antimony and mercury, the entire ingredient of the Pil. Calom. Comp. Ed. Phar., which is commonly called in Scotland, "Plummer's Pill." His remarks on this compound were published in the 'Edinburgh Medical Essays' for 1751

Monteath. It is likely, therefore, that it was Boerhaave's system of chemistry that would be inculcated. Concerning the school of iatro-chemists which flourished a little posterior to alchemy neither could it be said that its doctrines found much favour in Edinburgh, because Dr. Archibald Pitcairne, one of the most strenuous opponents of this system, was titular Professor of Medicine, and one of the chief physicians in the city during the latter years of the seventeenth century. He died, in fact, the very same year (1713) in which Dr. Crawford was appointed Professor of Chemistry. Before he settled in Edinburgh he had been a Professor at Leyden, and had had Boerhaave for his pupil. And both then and subsequently, he strove to demolish the doctrine of Paracelsus, Van Helmont, Sylvius, and Willis, who were the great exponents of iatro-chemistry.

Moreover, it is a fact that Pitcairn and Monteath were great friends; and, indeed, it is possible that this friendship may have been one of the causes of Monteath's starting as a chemical teacher. It is not likely therefore that Monteath gave currency to the speculation of the iatro-chemists, while under the wing of Pitcairne. Again, neither is it likely that Drs. Crawford or Plummer taught iatro-chemistry: their being pupils of Boerhaave, and the latter's love of his master, Pitcairne, would prevent that.

We may but describe the state of chemical science of this period, then, as being that which was taught at Leyden by Boerhaave. The science, in fact, was in a transition state; the period lay between the death of alchemy and the dotage of iatro-chemistry on the one hand, and the dawn of the Phlogiston epoch on the other.

It must be remembered however that Boerhaave's great work, 'Elementa Chymica,' shows that he desired to retain all that was valuable in the works of his predecessors. The pursuit of the *alkahest*, or philosopher's stone, had enriched science with many facts and processes; and even the speculations of those chemical physicians or iatro-chemists, who ascribed all the phenomena of disease to processes going on within the body, which were similar to those the chemist could perform on dead matter without it,—a kind of explanation of pathological phenomena this, not unlike that of the present day in treating, at any rate, of the propagation of certain fevers. But to return. Even the speculations of this school were not lost on Boerhaave, so that his work may be described as a repository of all that was then known to be true about chemistry. Boerhaave defined our science as "an art which teaches the manner of performing certain physical operations, whereby bodies cognizable to the senses, or capable of being rendered cognizable, and of being contained in vessels, are so changed by means of proper instruments as to produce certain determinate effects; and at the same time to disclose the causes thereof, for the service of the various arts."

The Stahlian theory of combustion, or what is now better known as the Phlogiston theory, had not long been promulgated, when in 1756, Dr. William Cullen was appointed to succeed Plummer in the Chair of Chemistry. He had lectured for the previous session as Dr. Plummer's colleague, but the latter died before the session was out. Cullen had come from Glasgow, where he had successively filled the Chairs of Chemistry and Practice of Physic. He acquired, during his incumbency of these, great fame as a teacher, so that when he came to Edinburgh he by no means diminished the celebrity of its school of medicine. It was mainly however as an expositor that Cullen was great; he was not a contributor to Chemistry of original observations. When in Glasgow he read one paper to the Physical Society there, 'On the Cold Produced by Evaporation.' But though his original papers were few, his ability as an expositor made him still a great man. He was a fluent speaker, and employed almost an exuberance of illustration in his lectures. It is to be noted too, that he was the first to use diagrammatic views of chemical decomposition,—a practice now so universal, and of such acknowledged usefulness, that no teacher of chemistry now dispenses with it.

Dr. Cullen discharged the duties of the chemical chair for ten years, when in 1766 Dr. Joseph Black succeeded him, while Cullen became Professor of the Practice of Physic, for the duties of which he may safely be said to have been better qualified, as his inclination was rather to study practical medicine than chemistry.

There are few names that have conferred on our University greater lustre than that of Cullen himself, and that of his successor Dr. Joseph Black. The latter was first a pupil and then a friend of Cullen's, and had succeeded him in the chemical chair in Glasgow, where he had conceived his theory of latent heat, and also published his other paper

on 'Fixed Air.' By these two memoirs Dr. Black is best known. Both of them exhibit his power of patient investigation as well as great ingenuity, in devising the means of throwing the light of experiment on the truths he had discovered.

Vigorous, however, as was the intellect of Cullen, and great the ingenuity of Black, yet both were led most fully to believe in and to teach the doctrine of that most vigorous theorist, George Ernest Stahl, and of his predecessor Joachim Becher. Indeed the teaching of both was tinged with conservatism, for it seems quite true that Cullen and Black gave a place in their lectures to the doctrine of four ancient elements, a figment of the old Aristotelian philosophy. It is strange that Black did not foresee the fall of the Phlogiston theory, and even lend a helping hand to its destruction, as his experiments on fixed air would have furnished him with facts enough for such a purpose; but the demolition of the Stahlian doctrine was reserved for Rey and Lavoisier, and they literally weighed the theory in the balance and found it wanting. The end of the eighteenth century saw the fall of the Phlogiston theory almost everywhere else but in Edinburgh, and then though Black performed before his class the *experimentum crucis* of Lavoisier—the decomposition of calx of mercury by heat,—yet he failed to see the full meaning of the experiment, and so he believed in phlogistism till his dying day.

In 1799 Joseph Black died, and his assistant Dr. Charles Hope succeeded him, and there came in with Hope the present case of things, as the first ten years of this century were almost unparalleled in their fertility of chemical discovery. Two great men —Dalton and Davy—were each in their own way literally illuminating our science with new and great truths. Dalton then matured and published his 'Law of Multiple Proportion' and his 'Atomic Theory,' while Davy, a few years later, was engaged in splitting such simple things as potass and soda into oxygen and two new metals which possessed properties of the most surprising kind.

Dr. Hope welcomed those new discoveries, and gave his class the benefit of his illustrations of them. Like his predecessor Cullen, Hope was more of an expositor than a discoverer, yet in the latter character he was not altogether barren, and his paper on the 'Maximum Density Point of Water' was a model research, and his discovery of the new earth strontia was no mean contribution to science.

I have to notice now revival of the teaching of chemistry in Edinburgh, independent of the University. The same year of Hope's election to the chair, or perhaps a year later, Dr. John Murray, whose name was mentioned at the outset of this paper, took the field as a private lecturer. In 1801 he was followed by another—Dr. Thomas Thomson. Both of these teachers were very successful; but perhaps the palm of popularity was borne by Murray. He also lectured on Natural Philosophy and Materia Medica, but his chief occupation was teaching Chemistry. As soon as he commenced lecturing he brought out the first edition of his 'Chemistry;' but the work on which he rested most of his reputation was a small monograph, 'On the Analysis of Mineral Waters,' in which he discussed the views of Berthollet on the range of affinity, and of Berzelius on the constitution of the salts of muriatic acid.

Dr. Thomson, his contemporary, was an indefatigable teacher of both practical and systematic chemistry. He had been originally intended for the Church, but forsook the study of theology for that of medicine and chemistry. While in Edinburgh, Thomson commenced those labours in chemical mineralogy, by which he is best known. A glance at most of our works on mineralogy will show how much he enriched our knowledge in this department of science. While in Edinburgh he also published the first edition of his large 'Treatise on Chemistry.' This work is somewhat remarkable as being the first British work on our science to contain an exposition of Dalton's laws of combination or atomic theory. In 1817 Dr. Thomson was appointed Professor of Chemistry in Glasgow University, which he held till 1852.

In 1818 the late Dr. Andrew Fife commenced his career as a lecturer; and two years afterwards, in 1820, Dr. John Murray died, but was immediately succeeded by his son. Hope continued to represent Chemistry in the University, and Murray out of it, till 1824, when a third lecturer, Dr. Edward Turner, began a course of lectures, which, however, he had only finished when he was appointed to the Chemical Chair in the newly-formed University of London. In connection with Dr. Fife's name I may here notice a successful attempt to teach Chemistry to artisans in connection with the School of Arts, an institution founded in 1821. Chemistry was

first taught here by Fife; and all through its existence, up till now, this science has formed a staple branch of instruction in it. A former, but less successful attempt to teach Chemistry popularly had been made by Mr. John Denham.

The same year in which Dr. Turner left for London, Dr. David Boswell Reid began to teach our science. But he only lectured one session, when he received the appointment of assistant to Professor Hope, and demonstrator of practical chemistry in the University. He was not long satisfied with this arrangement, however, and wished to have his demonstratorship elevated into an independent professorship. His efforts to effect this brought him before the public more than once as a pamphleteer; but the controversy ended in Dr. Reid's resignation, and subsequent establishment of himself as a private lecturer on a somewhat more extended scale than his predecessors or colleagues. It was now that he carried on those experiments on ventilation which ultimately led to his well-known appointment in connection with the building of the New Houses of Parliament, at Westminster.

Dr. Reid also wrote a Treatise on Chemistry, and was the fifth lecturer in Edinburgh who had published similar works; his predecessors being Murray, Thomson, Fife, and Turner.

From 1829 to 1836 there were no fewer than five lecturers on chemistry in Edinburgh. In the former of these years Dr. William Gregory and Mr. Kenneth Kemp began to lecture at one time conjoined, and afterwards separately; the others were Dr. Fife, John Murray, jun., and D. B. Reid. Perhaps the least known of these, and yet a man well worth a passing notice, was Mr. Kemp. His name, had he published all his discoveries, would have been wider known. But his pen was idle to a fault. He knew, for instance, as early as 1835, methods of preparing potassium and sodium so successfully as to be able to show his students such masses of these metals as would have excited the envy of a chemist of even the present day.

In 1836 two of the five lecturers left Edinburgh; Dr. William Gregory went to Dublin, and Dr. Reid to London. But the next decade another name was added to the list, that of the late Dr. George Wilson. At this time, too, a contemporary of his—the late Dr. Samuel Brown—though never a regular teacher, yet now and again was engaged in a series of lectures on chemical philosophy. At this time he also published his papers on 'Isomerism of the Elements,' and the 'Transmutation of Carbon into Silica.' These, though the cause of much remark at the time, did not raise their author in the estimation of his collaborateurs in chemical science.

The year 1843 was an *annus mirabilis* in our chemical history, for then Dr. Hope resigned his chair, and a keen contest took place for his successorship. The candidates were Drs. Gregory, Fife, Brown, Anderson, Playfair, and Professor Connel. Amongst these the Town Council had great difficulty in settling the precedence; but at last their choice fell on Dr. William Gregory, then Professor at King's College, Aberdeen. The vacancy in that Northern University took away from Edinburgh Dr. Fife, and in his place came Dr. Thomas Anderson, who lectured from 1844 till 1853, when he succeeded Thomson as Professor at Glasgow University.

From 1841 till 1854 the late Dr. George Wilson was also teaching chemistry most successfully. In the latter of these years he was honoured to fill the newly-made Regius Chair of Technology as well as Director of the Scottish Industrial Museum—appointments which he held for only too short a time. He was suddenly cut off in November, 1859, and chemical science lost an able expositor, and many a young chemist lost an amiable and kind friend.

In drawing this rapid and necessarily bare outline of the history of the Edinburgh School of Chemistry to a close, I would simply remark one thing, which is, that it must surely show this, that, as a school, it has in times past been a fruitful *alma mater* of chemists. Had space been permitted me, I should like to have developed somewhat more fully the changes in belief in chemical science during the century and a half included in this sketch. But enough has perhaps been said to convey at least the ames, as well as some idea of the more important doctrines, which from time to time have been promulgated during the period.

A vote of thanks was passed and carried unanimously to Dr. Thomson for his interesting paper.

The SECRETARY made some intimation regarding the approaching annual meeting, as well as in reference to the Museum and Library, and the meeting thereafter adjourned.

THE ANNUAL MEETING.

The ANNUAL MEETING of the Society took place here on Monday evening, 21st current, in George Street Hall; Mr. AINSLIE, President, in the chair.

The PRESIDENT gave his

VALEDICTORY ADDRESS.

Gentlemen,—Having now arrived at the conclusion of our Session, it is expected of the President, previous to vacating the chair, to give a *résumé* of the scientific meetings held during his term of office, to mention the names of the different gentlemen who have honoured us with their contributions, and to recall to your remembrance in a cursory manner the different subjects discoursed upon. Commencing then with Professor Archer's address, "On the Present and Future Prospects of British Pharmacy," I think all who had the pleasure of hearing him must have been highly gratified. After pronouncing an encomium on our lamented friend Jacob Bell, and the little band who so warmly co-operated with him, he drew a parallel between Continental and British pharmaceutists, giving it as his opinion that the Continental system, although excellent in itself, is inferior as a whole to our own. A fair comparison of the two sides of the question would, he felt assured, result in the proof that in the new phase which British pharmacy has assumed there is more of real usefulness, more reason to hope for great results, than in the much-boasted system of France, which, from its general diffusion, may be called the Continental method. At the same time, he very significantly hinted that the *old system* of this country was immeasurably inferior to that of our Continental neighbours. Perhaps there is one point on which I might slightly differ from the learned professor, as to the desirableness of establishing colleges in the three kingdoms. I think the colleges we have are sufficient in every respect, if the Legislature will permit the Pharmaceutical Society, as at present, to examine their own licentiates, or practitioners. Professor Archer then exhibited to the meeting a Chinese teapot, made of native red sulphuret of arsenic (realgar), used, he stated, for the administration of minute doses of arsenic as a specific. It had just been presented to the Industrial Museum of Scotland by Mr. Daniel Hanbury, of London.

We were indebted to Professor Gamgee, of the New Veterinary College, at our second scientific meeting, for an able communication "On the Influence of the Study of Comparative Therapeutics on the Progress of Pharmacy." After a few preliminary remarks, he observed that the days were gone when twenty drugs were mixed up in a draught, or pill-mass, and each separate agent was supposed to overpower one of the many morbid actions peculiar to the disease prescribed for. He then suggested to the members the study of comparative therapeutics as a means of ascertaining the actions and doses of medicines, and he concluded by showing the great necessity there existed for an infirmary for the treatment of sick animals, where experiments could be instituted which would be of the highest importance to "the progress of universal medicine."

At our third meeting, Dr. Stevenson Macadam gave us an interesting lecture on "Spectrum Analysis," which, by the aid of the electric light, was illustrated in a very beautiful and striking manner. Throughout a long series of experiments there was not a single failure; and, when we remember the extreme nicety and care which are requisite to ensure even partial success, I feel assured that I express the feelings of all when I say that we lie under a deep debt of gratitude to Dr. Macadam for the great amount of labour, trouble, and expense which he personally undertook, in order to gratify and instruct our members and associates; and I have no doubt it will be pleasing for him to know that his experiments and very able lecture were so highly appreciated. Mr. Mackay also laid before the meeting a few of the new poison-corks invented by

Mr. Bird, of Liverpool, which were approved of as being likely to prevent accidents from the incautious taking of poison by mistake.

At our fourth meeting, we were favoured with a lecture "On the Dental System of Man and the Lower Animals," by Dr. J. Smith, F.R.C.S., Surgeon-Dentist, etc. After alluding to the amount of ignorance prevailing in reference to such matters, the lecturer proceeded to describe the dental system met with in various interesting instances among the lower animals, etc. The members of our Society were particularly gratified on that occasion by the presence of most of the leading dentists in the city, and hope on any similar occasion in future to have the pleasure of their presence.

At our fifth and last meeting, we were honoured by hearing a lecture by Dr. Murray Thomson, entitled "Historical Remarks on the Edinburgh School of Chemistry and its Teachers," in which he alluded to the different gentlemen who had taught this branch of science from a very early period down to the present time, etc. etc. There can be no doubt that lectures such as we have been favoured with are particularly suggestive, and have a decided tendency to make our students devote themselves to trace out the different subjects treated upon, thereby laying up a store of knowledge that will enable them, as they advance in life, to become ornaments of their profession, and gain for them the increased confidence of the public.

Before leaving the subject of our scientific meetings and lectures, I sincerely hope that all of us have profited by the information conveyed on so many different subjects. On this point masters as well as young men would perhaps do well to ponder a few truthful and weighty words which I lately met with in the life of Samuel Budgett:—

"Some men glide amongst events like sand in a glass, leaving no trace of what they have passed through. They are no wiser for a hundred lessons, no more modest for a hundred failures, no more cautious for a hundred errors. Others pass through events like waters through the soil, carrying with them a tinge of all they traverse. On some life is lost—death alone can make them wiser. On others no event falls fruitless; there is for them an improvement and an instruction in all things. To the unwise the past is an exploded match, that has flashed and missed and is useless. To the wise the past is a steady lamp, shedding light on the path of the future. If a young man do not learn from the things that befall himself, grey hairs will be no glory to him."

We have had two meetings for examination, and admitted several candidates, whose appearance, as a whole, was satisfactory to the examinators; showing, at least, an undiminished attention to the different subjects of examination. I regret to have to mention that no essay has been given in for the President's prize, as I hoped to have had the pleasure of presenting one to the most successful essayist; but, in order to stimulate some of our young men to increased energy, I shall have much pleasure—with the permission of my successor in office—in continuing my offer until the commencement of the Winter Session, and hope that many of our young friends will be found on the list of competitors to enable me to present this prize to the successful essayist.

In the December number of 'Journal' an article appeared by Mr. W. S. Cleave, of London, on the "Eclectic Pharmacy of the Americans." He observed that these said eclectic, or selected, resinoid preparations are not new in principle, as we have long had resin of scammony, jalap, etc., which are prepared in the same manner. Professor Bentley, too, furnishes an excellent paper in the March number of 'Journal' on *Podophyllum peltatum*, which most of you must have perused: to the best of my knowledge there are few that can strictly be called new remedies of importance that have lately come in to use; but I think many of these American remedies might be experimented upon with advantage, as a large proportion of the people of the present day seem to desire novelty in physic as well as in other things.

I regret that I cannot congratulate you on possessing the 'National Pharmacopœia' as I expected to have done, owing, I believe, to the enormous labour necessary in the preparation of so important a national work; but I trust that it will be in the hands of every one of us before my successor in office gives his opening address next winter. It is a source of regret to the Council that we require to leave George Street Hall, where we have held all our meetings for several years, and which, on the whole, is well suited for our operations; but this inconvenience will, I trust, speedily cease to exist, as we hope to obtain new rooms for our library and museum, and an excellent hall for our meetings, at a very short distance from our present premises.

I believe the alteration in the bye-laws has been carried. Although not entirely agreeing with all that the Council in London have done, I hope that these alterations, which have been devised with the best intentions, will have the effect of increasing the prosperity of the Society in the way most to be desired, viz. a vast accession of numbers on every day of examination, so as to fill the places of those who have struggled to place the Pharmaceutists of Great Britain in the prominent position they ought to occupy as compounders and dispensers of medicine.

Through the kindness of Professor Archer we are to have the enjoyment of a *conversazione* at the Industrial Museum at the end of this month, which I have no doubt, through the great exertions of our Secretary, etc., will be a source of great gratification to all our members and their friends.

To our Secretary I need scarcely say how deeply I have been indebted for his assistance and courtesy: I feel that it is impossible for any one, who has not been in my position, to understand how laborious are the duties of the Secretaryship; and I think it was a wise step taken by us to propose Mr. Mackay as our London representative, for I am sure your interests, as well as the interests of the Society at large, will be much benefited by this highly-judicious appointment.

Allow me now, gentlemen, before vacating this chair, to express to you the high satisfaction I have experienced in this honourable position. Although reluctant to accept this office from a feeling of my comparative unfitness, I feel that the duties have been most agreeable to me, by reason of the kind forbearance of the members and the co-operation of my colleagues. I hope never to forget this act of confidence; and I trust that the additional experience gained during my period of office will enable me to be increasingly serviceable in the private position to which I now return.

The Secretary then read the

ANNUAL REPORT.

The Council have now, as usual, to submit to this meeting their Annual Report of the operations of the Society in Edinburgh during the past session.

The scientific meetings have been *five* in number, and were well and numerously attended. Some of the communications possessed more than usual interest, and the Council beg to take this opportunity of thanking those gentlemen who have so kindly and so ably assisted in keeping up the interest of these Pharmaceutical reunions.

Much disappointment has been felt at the non-appearance of the 'National Pharmacopœia,' a work which has now been for some time past anxiously and eagerly expected by Pharmaceutists generally. It was confidently anticipated that ere this the work itself would have been in the hands of all interested, but it appears that we must be content to wait a little longer before this important work is made available. There can however be little doubt, from the labour already overtaken by the Committees, that the close of the present year will see the volume out of the publisher's hands, and in possession of all those who may desire to have a copy.

The Council are still adding to the Library, but they regret that the Museum is not extending for want of aid. Hitherto all the specimens have been given gratuitously, and it is hoped that the mere allusion to the languishing state of this valuable department of the Society, will induce members and others to make an effort to contribute, so far as they can, such specimens of drugs, chemicals, and pharmaceutical preparations, as may still be wanting to increase the value and interest which ought to attach to such a collection in connection with our Society. It is proposed at this time, to appoint a Curator, to whom a small sum will be given annually, who will devote more time to the Museum than has yet been done, and who will, under the superintendence of a Committee, supply the necessary jars, bottles, or casks, which may from time to time be required for holding such articles as may be added to the Museum.

The Council are still prepared to add to the list of Books in the Library already in possession of the Society, and hope that all will take advantage of the privilege afforded of getting books for perusal under certain regulations, which are printed and will be found pasted in the inside of each volume.

The Council cannot refrain from expressing their great disappointment at the non-delivery of any Essay in competition for either the President's or Register Fund Prize.

Judging from the Essays lodged last year, the Council had good ground to hope that this session would see an improvement on last, and can only record their great regret that not one communication has been sent in to the Secretary. Under the circumstances, however, it has been thought better to intimate, that papers competing for either of the above prizes, on any subject connected with Pharmacy or Chemistry, will be received by the Secretary up till 1st October of current year; and the Council hope that during the leisure of summer a few Essays may be written and sent forward, so that they may have the pleasure at the opening of such session of awarding both prizes to the successful Essayists. Of course, the competition will be open to all Associates and Apprentices connected with the Society in England as well as in Scotland.

The following is a statement of account as from 1st January to 31st December, 1861.

Dr. *The Secretary in Account current with Society, December* 31*st*, 1861. *Cr.*

1861.		£.	s.	d.
Aug. 3.	Cash from London	50	0	0
Dec. 30.	Balance due Secretary	14	14	4
		£64	14	4

1861.		£.	s.	d.
	Paid rent of rooms	25	0	0
	Attendance at meetings, delivering billets, cleaning rooms, etc.	3	0	0
	Advertising	2	1	6
	Insurance	0	7	6
	Postages	1	8	11
	Expenses of Scientific Meetings	5	1	3
	Books for Library and Cases for Museum	18	4	9
	Publications	1	13	8
	Printing	3	14	0
	Expenses at Annual Meeting	2	16	0
	Boxes for Specimens to be used by the Board of Examiners	0	16	0
	Paper and Envelopes	0	10	9
		£64	14	4
Dec. 31.	Balance over or due to Secretary	14	14	4

We, the undersigned, have examined the foregoing accounts, with vouchers attached, find them correctly stated and entered, and the balance due to the Secretary at the 31st December, 1861, fourteen pounds, fourteen shillings, and fourpence, sterling.

WILLIAM AITKEN.
P. R. YOUNG.
WM. SMITH.

Edinburgh, 21*st April*, 1862.

All present will doubtless be aware, that after many meetings and great deliberation, the Council in London have at length made considerable alteration in some of the Bye-laws. These have been confirmed by a special meeting of the Society, and it would therefore be out of place to offer any remarks upon them here. It is hoped that these proposed changes may prove of service in adding to the numerical strength of the Association, as well as increasing the annual returns now required to maintain the current expenditure connected with such extensive operations as those undertaken and carried on by the Society in Bloomsbury-square. It may simply be remarked, that the same feeling exists here, which has been more than once expressed in reports such as the present, that had the Council in London thought it practicable and right to reduce the registration fee to a still smaller sum than the one fixed, viz. £10. 10*s*.; a large increase of Members and Associates might, with some degree of certainty, have been expected both here and in other districts in Scotland.

In concluding, the Council hope their brethren in office in London will kindly lend a helping hand to obtain for the branch of the Society here, some specimens of drugs and chemicals, which will doubtless at the close of the Great Exhibition be drafted into different places and divided among different societies. Such a contribution would be highly prized, and would tend to increase the interest which is already felt towards the nucleus of what it is anticipated may yet in the course of time be a Museum worthy the branch of the parent Society.

Mr. CONACHER, of Markinch, moved the approval of the Report, which was seconded by Mr. ANDERSON, of Musselburgh, and carried with applause.

The Office-bearers for the following year were then proposed and elected, as follows :—

President.—Mr. Aitken.
Vice-President.—Mr. George Blanshard.
Council.—Messrs. the President and Vice-President, D. R. Brown, Flockhart, Gardner, Gray, Kemp (Portobello), Hardie (Dundee), Hart (Glasgow), Raimes, Stephenson, Young, Tait, and Ainslie.
Examiners.—President and Vice-President, and Messrs. D. R. Brown, Flockhart, Tait, Gardner, Kemp, and Ainslie, with President and Vice-President in London, and Secretary, Edinburgh, *ex officio*.
Recommended as Member of Council in London.—Mr. John Mackay.
Curator of Library and Museum.—Mr. William Hill, Associate, to whom it is proposed to give a sum of £5 per annum.
Library and Museum Committee.—The President, Vice-President, and Secretary for the time being, and Messrs. Ainslie, Stevenson, and Young.
Secretary.—Mr. John Mackay.

Some conversation took place as to the desirableness of making an arrangement, by which country members might have opportunity of availing themselves of the books in the library ; and one or two present having expressed an opinion that such a privilege would be considered a great boon in some districts, it was remitted to the Library and Museum Committee for consideration.

THE ANNUAL SUPPER.

Immediately after the Meeting, the Members and their friends met in the Rainbow Hotel, for the purpose of attending the Annual Supper of the Society. Mr. Aitken, President, in the chair, and Mr. G. Blanshard, Vice-President, Croupier.

Above ninety gentlemen assembled, and after the cloth was removed, the Chairman read apologies from Dr. James Young, Dr. S. Macadam, Mr. Gardner, etc. The usual loyal toasts having been given, the President gave as the toast of the evening, "The Pharmaceutical Society," which was received with great applause. The following were then given in succession :—"The University," by the Croupier, responded to by Dr. Murray Thomson ; "The Royal Colleges of Physicians and Surgeons," by Mr. Ainslie, responded to by Dr. Alexander ; "The President and Council in London," by Mr. Gamgee, responded to by Mr. Mackay ; "Pharmaceutical Education," by Dr. M. Thomson ; "The Memory of Jacob Bell," by Mr. Young ; "Professor Gamgee and the New Veterinary College," by Mr. Nicoll, responded to by Professor Gamgee ; "The Examiners in Edin," by Mr. Stephenson, responded to by the Chairman ; "The Honorary Members," by Mr. Kemp, of Portobello ; "The Retiring President," by Mr. W. Baildon, Mr. Ainslie replied ; "The Country Members," by Mr. Raimes, Mr. Conacher replied ; "Visitors present," by the Croupier, Mr. Sang replied ; "The Ladies," by Mr. Noble ; "The Chairman," by Mr. D. R. Brown ; "The Croupier," by Mr. Mackay ; "The Secretary," by Mr. Anderson.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Tenth General Meeting was held at the Royal Institution, March 6th, 1862 ; the PRESIDENT in the chair.

The minutes of last meeting having been read, the following donations to the Library were announced by the SECRETARY :—the 'Pharmaceutical Journal' for March, from the Society ; the 'Technologist' for March, from the editor ; a 'Greek Dictionary' and Hardwick's 'Chemistry,' from Mr. N. Mercer.

Several specimens of Submarine Telegraph Cable, including the earliest and latest forms, were exhibited by Mr. Mercer.

Mr. Martin Murphy then proceeded to read a paper "On the History, Manufacture, Nature, and Properties of Coal Gas," illustrated by diagrams and experiments.

Mr. Murphy's paper not being concluded at the usual time for closing the proceedings, he kindly promised, at the unanimous request of the meeting, to continue the subject on a future occasion.

The Eleventh General Meeting was held at the Royal Institution, March 20th, 1862; the President in the chair.

After the minutes of last meeting had been read by the Secretary, Mr. M. Murphy gave the concluding portion of his paper "On Coal Gas." At its close, Mr. Murphy received the thanks of the meeting for his able communication. A discussion on the prominent points in the paper then took place, in which the Chairman, Mr. W. King, Mr. N. Mercer, Mr. T. Edwards, and other members, took part.

The Twelfth General Meeting was held at the Royal Institution, April 3rd, 1862; Mr. N. Mercer in the chair.

The minutes of last meeting were read. A letter from Dr. J. B. Edwards was read, announcing that the Annual Laboratory Prize given by the President of the Association had this year been awarded to Mr. J. Geake, Assistant to Mr. C. Jones, Birkenhead. An extra prize to senior students, for practical analysis, had been gained by Mr. H. Bird. The progress of the students in the Laboratory during the session was reported to have been highly satisfactory.

The Secretary announced the following donations to the Library:—the 'Pharmaceutical Journal' for April, from the Society; the 'Technologist' for April, from the editor; 'Annual Address of the President of the Royal Institution,' from the Council; 'One Thousand Practical Receipts;' Kemp's 'Phasis of Matter,' two vols.; and 'The Domestic Chemist,' from Mr. N. Mercer. The thanks of the meeting having been given to the donors, Mr. Thomas Sherlock read a paper "On the Soda and other Chemical Manufactures of Spain," of which the following is an abstract:—

The soda districts of Spain are three in number, but owing to the want of fuel and of means of communication, only one of these, the largest and most central, has hitherto been partially worked.

This district, situated in the province of Madrid, about thirty miles south of the capital, consists of a series of ranges of low hills, forming the boundaries of a number of valleys, through which run the rivers Tagus, Tarama, and Manzanares. The town of Aranjuez, the spring residence of the Court, situated on the line of railway from Madrid to Alicante, forms the outlet of the district, and a means of communication with surrounding towns. The general appearance of the locality is such as to impress the observer with the idea that the whole district has at some period been under water, and formed a large lake or inland sea, from which the water has in process of time drained away or evaporated, leaving heaps or hills of saline matter scattered in ranges over the ground.

These hills constitute the soda mines, and consist of sulphate of soda, common salt, gypsum, and clay, in almost all kinds of combinations and proportions. The presence of common salt in considerable quantities in many of the deposits, and the impossibility of obtaining sulphuric acid for its decomposition, render it necessary for the soda manufacturer to select with much care the mineral best adapted to his purpose and as free as possible from chloride of sodium. The consequence is, that large tracts of these deposits cannot at present be turned to account, in consequence of the amount of chloride of sodium they contain. There exist, however, abundant deposits comparatively free from soluble impurities, and these are selected as the sources of mineral for subsequent operations.

The great bulk of these hills is a mere mechanical mixture of the various substances, the amount of sulphate of soda varying from 10 to 80 per cent., and a simple lixiviation with water is sufficient to extract the soluble portion. Occasionally are found beds of Thénardite, a very pure form of sulphate of soda, in crystalline masses and nearly

anhydrous. This is an exceedingly valuable mineral to the soda manufacturer; it only requires crushing to a coarse powder, when it may be used at once in the subsequent production of the crude soda or barilla.

Another mineral frequently met with in masses, is Glauberite, the double sulphate of soda and lime; it is always avoided or rejected in consequence of the difficulty of getting rid of the sulphate of lime.

A third and very peculiar combination is also frequently found, consisting of a crystalline mass of sulphate of soda, containing usually some 30 per cent. of water, and interspersed throughout its entire substance with small granules of carbonate of lime. The combination appears extraordinary under the circumstances, and in the presence of so much water. When dried, this mineral with a very little addition, or alteration of proportion, may be converted at once into crude soda by the usual process.

The preparation of sulphate of soda is therefore a very simple operation. The mineral is thrown into vats or tanks constructed of blocks of gypsum cut from some neighbouring hill; boiling water is then run on, and the whole allowed to macerate until cold; the solution thus obtained, is drawn off into other tanks or deposits, where it is stored, and the clay and other insoluble matters subside. The clear solution is then conveyed by suitable channels, to the evaporating beds, where, exposed to the full heat of the sun, a large amount of water is removed. At night, as the temperature falls, crystals are formed, which the following day are raked out, and a fresh supply of solution added. Finally, the crystals are dried by a further exposure to the sun's rays.

During the summer months a considerable quantity of sulphate of soda is thus prepared, and so effectual is the exsiccation, that when carefully managed, the finished product should not contain more than five per cent. of water.

The next stage of the manufacture is the conversion of the sulphate into carbonate of soda by the usual process of smelting it with chalk, and some form of carbon, in a black-ash furnace. The want of coal as fuel is much felt at this stage of the manufacture. The use of wood necessitates the construction of very large fire-grates, and the rapidity with which the wood is consumed requires the fire-door to be frequently opened for the admission of fuel. The consequence is, that quantities of air rush into the furnace, materially interfering with the reduction of the sulphate of soda by the carbon.

The use of wood-charcoal also, instead of small coal, as the reducing agent, has certain disadvantages. Wood-charcoal, being a much purer form of carbon than small coal, a smaller proportionate quantity is required in mixing the charge for the furnace; but this apparent advantage is more than neutralized by the greater length of time and expenditure of fuel in effecting the reduction. The texture of wood-charcoal is such, that it burns slowly, and, when used, broken into small pieces like small coal, a period of four or five hours is necessary to effect the complete decomposition of the sulphate, while the resulting black ash is excessively hard and insoluble. To obviate this difficulty and shorten the time, the ingredients require to be ground to fine powder, and intimately mixed, before being introduced into the furnace, an operation involving much additional labour and expense, and wholly unnecessary when small coal is used.

Hitherto, the production of crude soda, or barilla, has been the sole aim of the manufacturer, the article being extensively used in the making of soap. Last year, however, another step in advance has been made, and white ash, of native manufacture, introduced. The expense and increasing scarcity of wood-fuel is a material drawback to the success of the business; but when coal becomes available, and better means of communication are established, there is no reason why this peculiar district should not become one of the largest seats of the soda manufacture in the world.

J. S.

The Thirteenth General Meeting was held at the Royal Institution, April 17th, 1862.

The minutes of last meeting having been read, and some other business of a formal character transacted, Mr. J. H. Geake was elected a Member of the Association.

Mr. A. N. Tate read the paper for the evening, "On the Manufacture of Carbonate of Soda," illustrated by diagrams, and a valuable and complete collection of specimens from the Museum of the Association.

Mr. TATE first gave a brief history of the soda manufacture; and after an allusion to Mr. Sherlock's account of it as carried on in Spain, proceeded to describe the various processes for the manufacture of sulphuric acid, black ash, white ash, soda crystals, and bicarbonate of soda, as carried on in Great Britain. The paper was of a very interesting and practical character, and at its close Mr. Tate received the unanimous thanks of the meeting.

ORIGINAL AND EXTRACTED ARTICLES.

ON COATING PILLS.

BY BARNARD S. PROCTOR.

The subject of coating pills with the view of rendering them tasteless if retained in the mouth for a few seconds, and yet not impairing their solubility in the stomach, is one which has attracted considerable attention of late; many processes have been suggested, some apparently without sufficient consideration of the various requirements of the case. The objects to be attained in addition to covering the taste and odour, are a ready solubility in the stomach, resistance to the influence of a damp atmosphere, freedom from a tendency to shrivel in a dry one, smoothness and uniformity in the appearance of the coat, facility in the operation, and speed in its performance. The following experiments were designed to test the merits of various processes, and were suggested by finding that silvering very imperfectly covers the taste, and that Furley's process is not advantageous for pills kept in a damp situation.

Compound Rhubarb Pills were selected for the experiments. The processes were as follows:—

1. Rolled in albumen, then in tragacanth and sugar mixed in equal parts, and finely powdered. (Furley.)
2. Water poured upon the pills and immediately poured off, the pills being then rolled in powdered tragacanth. The water immediately began to dissolve the surface. The gum coated them pretty completely, but not quite uniformly.
3. Rolled in a wet dish and then in powdered tragacanth. The dish was immediately coloured by the solution of the pills; rather less gum adhered to these than the last.
4. Rolled in syrup and in powdered tragacanth. The syrup seemed repelled as by a greasy surface, had no visible solvent action, and took up but little gum.
5. Rolled in mucilage of gum arabic and in powdered tragacanth. The stickiness of the mucilage prevented the pills rolling freely, but did not prevent the solvent action. The tragacanth was taken up freely.
6. Rolled in mucilage of gum arabic and in powdered French chalk. Only a clotty surface could be produced.
7. Rolled in mucilage and lycopodium. A uniform surface could not be obtained.
8. Rolled in mucilage and in powdered sugar. Produced a rough clotted surface, which was not much improved by considerable rolling.
9. Rolled in albumen and in powdered tragacanth. The albumen acts very little upon the pills, and takes a uniform coating of powder.
11. Rolled in dilute syrup (syr. et aq. p. æq.) and in powdered tragacanth. Dilute syrup has not the excessive solvent action of water, nor the greasy appearance of syrup; it takes the powder uniformly like albumen.
12. Rolled in Canada varnish (*a*) and in magnesia. The varnish spreads beautifully with the pills, but takes a very thick clotty coating of magnesia.
13. Rolled in Canada varnish and lycopodium. Produced an uneven coating.

a. Canada varnish prepared by warming ʒss. Canada balsam with ʒj S.V.R., shaking, cooling, settling, and decanting the clear portion.

14. Rolled in Canada varnish and in French chalk. Produced at once a smooth silky white surface, not perfectly uniform.

15. Rolled in mucilage and in silver leaf.

16. Dipped in melted white wax. The pills appear to swell and crack the wax as it cools. Require rolling under a finisher to give a smooth surface. Twice dipping adds too much to their bulk.

17. Dipped in tincture of lac. Gives a good coat, but takes too long drying.

18. Rolled in tincture of lac and in French chalk. Coats very readily, but not quite uniformly.

19. Rolled in tincture of lac and in powdered tragacanth. Readily produced a uniform coating.

20. Dipped in collodion. Forms a beautiful bright surface, dries quickly, but in doing so contracts and squeezes a little pimple of the mass through the hole left by the pin on which it was dipped.

21. Rolled in collodion. Operation quick and easy, the surface not quite so smooth and bright as last.

22. Rolled in collodion and in French chalk. Operation very easy, the chalk very clotty at first, but afterwards greater part shakes off, and leaves the surface not uniformly covered.

23. Dipped in gelatine (as described in Redwood's 'Pharmacy'). The operation is performed without much difficulty; but if the coat is rendered thin at any point,—for example, by taking off the drop which hangs to a pill as it is lifted,—the gelatine contracting as it dries, squeezes the mass out at the weak part. The heat softens the pills, and renders them liable to drop off the pins if the operation is not dexterously performed.

24. Rolled in alcoholic syrup (*b*) and in fine powdered sugar. This alcohol syrup spreads more readily upon the pills, and has less solvent action, than the dilute syrup mentioned above. The sugar clotted very much, but on rolling in a sieve a good uniform coating was obtained.

25. The same as last, repeating the process thrice. A thick rough coating is produced.

26. Rolled in alcoholic syrup and in powdered tragacanth. Readily gave a uniform coat.

27. Rolled in tincture tolu (*d*) and in Furley's powder. Readily gave a uniform coat, with a strong odour of tolu.

28. Rolled in tincture of lac and in Furley's powder. Same as last, but little odour.

29. Rolled in tincture of lac and in resinous powder (*f*). Rather clotty; smells slightly of resin.

30. Rolled in tincture of lac and in lac powder (*g*). Readily produced an even coat with little odour.

31. Rolled in tincture of tolu (*d*) and in French chalk. Readily produced a coating not quite even.

32. Sample of the same pills uncoated, to be subjected to the same tests of solubility, etc.

33. Camphor pills rolled in tincture of lac and French chalk. The odour of the camphor is very palpable through the coating.

34. Camphor pills rolled in tincture of tolu and French chalk. The same as last.

35. Pills containing oil of chamomile rolled in tincture of lac and French chalk. The coating, at first white, soon becomes dark, probably from exudation of the oil, and the odour powerful.

36. The same pills rolled in tincture of tolu and French chalk. A much thicker coat of chalk adhered, which soon became yellow.

37. Rolled in tincture of lac (*i*) 6 drops to 1 doz. pills, and in French chalk. This

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b. Simple syrup and rectified spirit, equal parts.

d. One part balsam tolu dissolved in three of spirit.

f. Resin and French chalk, equal parts, finely powdered.

g. Gum lac and pumice-stone, rubbed with water to a smooth creamy liquid, and dried, forms a dusty powder with slight but not unpleasant odour.

may be considered a repetition of No. 18, with a definite quantity of a tincture of known strength. A more uniform coating was obtained.

38. Rolled in tincture of sandarach (*j*) and in French chalk.

39. Rolled in tincture of resin (*k*) 6 drops, and in French chalk.

40. Rolled in 3 drops each, *i* and *k*, and in French chalk.

41. Rolled in 6 drops of tincture of lac (*l*) and in equal parts of gum sandarach and French chalk. Rather clotted, but rendered smooth by shaking.

42. Rolled in tincture of lac and tincture of resin, equal parts, and in sandarach and French chalk. Not clotted.

43. Rolled in tincture of lac and resin, and in French chalk, mixed with lycopodium. Not clotted.

44. Rolled in stronger tincture of resin (*l*) and in silver-leaf. Took the silver not quite perfectly.

45. Rolled in equal parts of *i* and *l*, and then in French chalk, with one-fourth of powdered resin. Slightly clotted.

After the pills coated by the above processes had been kept in a moderately dry place for about two months, a selection of them were placed in the cellar to compare their keeping qualities under the influence of moisture. They were examined daily, and as soon as they were observed to become at all sticky the number of days they had been thus exposed was entered in the thirteenth column of the table below.

On the third day No. 24 was very sticky, on the fifth day it was wet; Nos. 21, 28, 36, 39, 40, 41, had lost their dusty coating; Nos. 15, 16, 17, 23, 29, preserved their original appearance, the others were becoming spotted; seventh day, No. 15 (silvered), though it looked very well would not bear handling, as the mass was soft and the coating easily rubbed off; 29 preserved its dusty covering, and 16, 17, 20, 23, had smooth, clean surfaces.

We observe that dipping is more effectual than rolling in varnish, etc. This is especially shown by 21 and 20, the latter being dipped, and the former rolled in collodion; 22 also being rolled in collodion and French chalk; and the various samples in which tincture of lac was used, that which was dipped (17), and that which was rolled in the tincture and then in resin and chalk mixed, were the only two in really good condition, though probably many of the others have as much resistance to the action of moisture as is necessary under ordinary circumstances.

In the table the first column gives the reference to the process for coating the pills, the next six uniform, mottled, clotted, smooth, granular, and dimpled, refer to the condition of the pills after two months' ordinary keeping. The eighth and ninth show the condition with regard to dimpling of the surface after keeping in a warm dry place two weeks and four weeks respectively, making a total of three months; the dimpling being the only visible quality in which they had changed during the month of drying. Of the numbers 0, 1, 2, and 3; 0 signifies that the quality at the head of the column does not apply to this specimen, 3 that it applies in the greatest degree, 1 and 2 being intermediate. The results indicated in columns 19, 11, and 12, were obtained with pills, having had two months' ordinary keeping and one month drying. Column 10 gives the time in minutes which the sample was immersed in cold water (about 50°) before the first tint of colouring matter was observed to diffuse through the coating; 11 gives the same with warm water (about 90°); 12 gives the time in hours which the sample was immersed in warm water before it was dissolved so completely that no solid core could be felt by gently pressing the finger down amongst the clot of slimy insoluble matter; 13 gives the time in days which the samples were exposed in a damp cellar, until they

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i. Gum lac ʒss. Spirit ʒii. m.

j. Sandarach ʒss. Spirit ʒii.

k. Resin ʒss. Spirit ʒii. m.

l. Resin ʒi. Spirit ʒiss. m.

became slightly sticky, so that they would not roll about the box without first being loosened from one another.

TABLE SHOWING THE KEEPING QUALITIES OF THE PILLS COATED BY THE ABOVE PROCESS.

Formula.	Uniform	Mottled.	Clotted.	Smooth.	Granular.	Dimpled.			Tinted.		Dissolved.	Sticky.
									Cold.	Warm.		
No. 1	3	0	0	0	3	0	0	0	10	7	1½	3
2	2	2	2	0	2	0	0	0	25	+	+	5
3	2	2	0	0	3	0	0	1	25	+	+	3
4	2	2	0	0	3	0	0	1	25	+	+	3
5	3	0	0	0	1	0	0	0	8	+	+	3
6	0	3	0	3	0	3	3	3	6	+	+	7
7	0	3	3	0	0	0	0	1	3	+	+	7
8	3	0	3	0	3	0	0	0	5	1	+	5
9	3	0	0	0	1	0	0	0	14	+	+	3
11	3	0	0	0	3	0	0	0	25	+	+	3
12	0	3	3	0	0	3	3	3	1½	+	+	7
13	0	3	3	2	2	0	0	0	6	+	+	7
14	0	1	0	3	0	1	1	1	10	+	+	7
15	3	0	0	3	0	1	1	1	1	+	1½	5
16	2	0	0	3	0	0	3	3		+	+	×
17	3	0	0	3	0	3	3	3	60	55	3	×
18	0	3	3	3	0	3	3	3	18	+	+	5
19	3	0	0	0	1	0	0	0	5	+	+	3
20	3	0	0	3	0	2	2	3	6	+	+	×
21	3	0	0	3	0	0	0	0	2	+	+	5
22	0	3	2	3	0	1	2	2	20	+	+	7
23	3	0	0	3	0	3	3	3	60	8	1½	+
24	3	0	0	0	3	3	3	3	1	+	+	3
25	3	0	3	0	3	0	0	0	3	+	+	+
26	2	2	2	0	3	2	2	2	50	12	2	3
27	3	0	0	0	3	0	0	0	10	+	+	3
28	2	2	2	0	3	3	3	3	40	+	+	5
29	3	0	3	2	0	0	0	0	30	30	2¼	×
30	3	0	0	0	2	2	2	2	5	+	+	7
31	0	1	1	3	0	0	3	3	5	+	+	7
32	2	2	2	1	0	0	0	0	1	+	1½	3
33	0	1	0	1	0	0	0	0	+	+	+	+
34	3	0	0	2	2	0	0	1	+	+	+	+
35	2	2	0	3	0	2	2	2	+	+	+	+
36	2	2	0	3	0	2	2	2	+	+	+	5
37	3	3	2	3	0	3	3	3	7	+	+	7
38	3	0	0	3	0	0	0	1	5	+	+	7
39	2	2	2	3	0	0	2	2	3	+	+	5
40	2	2	0	3	0	3	3	3	5	+	×	5
41	2	2	2	2	0	1	2	2	8	+	+	5
42	3	0	1	2	0	1	1	2	3	+	+	+
43	3	0	0	3	0	3	3	3	6	+	+	7
44	3	0	0	3	0	1	2	3	6	+	+	+
45	3	0	1	3	0	0	1	1	20	12	2	+

+ Not put to this test.
× Still in good condition after seven days' exposure.

These experiments show that the oft-repeated story about silvered pills being difficult of solution, must be looked upon as a popular error. The reason why pills occasionally pass through the stomach undissolved, must be sought for either in the state of the patient or the composition of the pill, rather than the nature of its coating; for even the dipping in lac varnish did not protect the pill for more than an hour, and in the stomach heat and moisture are assisted by chemical and mechanical means. It is worthy of remark that even the wax coating is permeable to moisture as indicated by the dimpling of the pill by long drying, and the bursting of the coat from swelling of the mass when exposed for a fortnight in a damp place. The steel pin used in dipping would leave only a very small perforation. In the rolling processes the coating of course has not this perforation, but the presence of the powder afterwards applied facilitates the disintegration of the varnish, unless the powder be such as adds to the varnish, resin for example.

Most of the formulæ yield coatings which are effectual in covering the taste of the pills for a sufficient time; their comparative efficacy may be judged pretty well from the tenth and eleventh column in the table.

As far as my experiments have gone, including some not recorded here, none of the coatings cover the odour of the pills, assafœtida, camphor, and volatile oils being very readily perceptible through them.

Of the various processes the easiest are those in which the pills are rolled in water, or varnishes, and then in powders; the viscidity of the syrup, albumen, and more particularly of mucilage, adding to the trouble of producing a complete covering. The dipping processes are yet more troublesome, even when apparatus especially constructed for facilitating the operation is used. And as the trouble is inversely proportionate to the number operated upon at once, they can scarcely be rendered available for dispensing purposes. Collodion is easiest, then varnishes (in consequence of their drying more slowly), and lastly those involving heat.

Comparing the advantages and disadvantages of the various liquids used, we find water inconvenient from its acting so rapidly upon the pills that they show signs of being dissolved by it even when the operation is performed with all speed; this solvent action is moderated by the presence of sugar, gum, etc., but at the same time it loses the readiness with which a perfect coating can be obtained; a mixture of syrup and spirit retains both these desirable qualities, but varnishes possess them in a still higher degree. Of varnishes, solution of lac in spirit probably has the greatest sum of advantages, being nearly free from taste and odour, and forming a tough film.

The powders used for rolling the pills in after they have received their fluid medium, also greatly influence the ultimate success. Magnesia, lycopodium, and sugar, are all very clotty when used alone. Sugar gives a granular rasp-like surface. French chalk readily produces a smooth uniform coat with many of the fluids, but when used alone is subject to dimpling, a feature which it loses when mixed with some material that makes it granular, such as powdered resin, to be used with a fluid having a solvent action upon the latter. The degree of roughness imparted in this way need not be so great as to be perceptible to the touch, as in Nos. 29 and 45 the granular surface was only evident under a magnifying power of 8 or 10 diameters, yet was sufficient to prevent the dimpling which characterizes those samples rolled in similar media without the resin. See 14 and 18. Tragacanth, which gives a similar degree of roughness, equally prevents the dimpling; compare 5 with 6, also 18 with 19. Probably the dimpling is produced by the surface not contracting in an equal degree with the mass of the pill as the latter becomes dry, and that the powders which impart a degree of roughness dispose the coating to shrink up in countless minute wrinkles rather than in dimples so large as to be visible.

The disadvantage of using coatings consisting of materials soluble in water, will be seen by the readiness with which many of the pills became adhesive when exposed in a damp situation, as seen in column 13; thus the addition of powdered sugar increased the tendency of the tragacanth to become sticky; compare 1 with 2; and tragacanth with tincture of lac was affected by moisture sooner than French chalk with the same.

The processes suggested by Mr. Banner,* in which tragacanth is used without sugar, have been objected to by Mr. Furley, who states that this gum cannot be used advantageously without an equal quantity of sugar, on account of its tendency to crack if the pills are kept for a few days. Though I have used pure powdered tragacanth in many cases, and have subjected the pills not only to two months' ordinary keeping, but to an additional month's drying at a warm temperature, I have not noticed any of them to crack. On the other hand the "agreeable" taste of tolu, which Mr. Banner considers advantageous, will only be acceptable to some patients; a *tasteless* coating is rather what should be aimed at for universal approbation.

I have found Furley's coating to become speedily clammy upon pills containing chloride of ammonium, and on others containing glycerine. Probably the choice of a process will depend in some measure upon the composition of the pills, and other circumstances which it is difficult to foresee. The processes 29 and 45 are those which appear to promise most general utility. The proportion between the quantity of the tincture and the number of the pills, considerably influences the quality of the coat. For dispensing purposes it is convenient to use a two or three-ounce pomatum pot, into which the tincture is dropped in about the proportion of four or five minims to a dozen pills, diminishing the quantity for larger numbers, then put in the pills, and shake them till uniformly covered, after which they are to be immediately thrown into the powder contained in a tray sufficiently large to allow of their rolling freely; when covered with the powder they may be immediately transferred to the box, but when the occasion permits, it is advantageous that a few minutes be allowed for the hardening of the varnish.

11, *Grey Street, Newcastle-on-Tyne, April*, 1862.

ON THE OCCURRENCE OF BERBERINE IN *XANTHORRHIZA APIIFOLIA*.

BY J. DYSON PERRINS, F.C.S.

Having lately observed the presence of Berberine in *Hydrastis canadensis*, it appeared to be worth while to ascertain whether this alkaloid also occurred in *Xanthorrhiza apiifolia*, another North American plant, which belongs to the same natural order, Ranunculaceæ. Professor Bentley having announced his early intention of describing the botanical characteristics, properties, uses, etc., of *X. apiifolia*, any account here is rendered unnecessary. Suffice it to say, that the root is of a fine yellow colour, and popularly called in the United States, "Yellow root." I was indebted to the courtesy of Daniel Hanbury, Esq., for a specimen of this root; but finding a large quantity would be required for my purpose, and failing to meet with it in this country, I obtained a supply from a correspondent in New York.

The mode of treatment adopted was extremely simple, viz.—Exhausting the bruised root with boiling water, and evaporating the liquid to a soft extract, which was digested in boiling alcohol so long as anything was dissolved; the

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* 'Pharmaceutical Journal,' January, 1862, page 374.

greater part of the alcohol was distilled off, and a little dilute nitric acid added to the residue; after standing for a day or two, fine crystals had formed, which were purified from resin and other matter by repeated crystallizations from water, with the cautious use of animal charcoal, always adding a few drops of dilute nitric acid to the liquid, which I prefer to hydrochloric acid; the pure salt finally consisted of fine acicular yellow crystals.

All the known reactions of Berberine were manifested; but in order to place the matter beyond dispute, the following analyses were made. The nitrate, as above described, was crystallized from water to get rid of any possible traces of free acid, dried at a temperature of 212° Fahr., and burned with chromate of lead.

No. 1. 5·002 grains gave 11·032 grains carbonic acid, and 2·058 grains water.

No. 2. 5·213 grains gave 11·504 grains carbonic acid, and 2·149 grains water.

	No. 1.	No. 2.	Fleitmann.*
Carbon, per cent.	60·15	60·18	60·15
Hydrogen	4·57	4·58	4·75

Some of the platinum salt was also prepared, dried at 212° Fahr., and burned with lead chromate.

6·132 grains, gave 9·981 grains carbonic acid, and 1·882 grains water.

10·243 grains burned with soda lime, gave 4·300 grains ammonio-chloride of platinum. 8·516 grains gave, on ignition, 1·544 grains platinum, which figures correspond with the following percentages:—

		Fleitmann.*
Carbon	44·39	44·44
Hydrogen	3·41	3·42
Nitrogen	2·59	2·52
Platinum	18·13	18·11

These results prove satisfactorily that Berberine occurs in *X. apiifolia*, thus adding another source for this very beautiful alkaloid. The amount present is not large; seven pounds avoirdupois yielded only fifty-two grains of the pure nitrate.

Worcester, April, 1862.

SULPHIDE OF ARSENIC IN COMMERCIAL SULPHIDE OF ANTIMONY.

BY R. REYNOLDS, F.C.S.

A few months since I received a small quantity of powdered black antimony for analysis, being informed that several calves had died after its administration, the animals had been dead some weeks, that the only sources of of evidence were the medicine itself, and such facts as had been observed with respect to symptoms. After reporting the analysis, the following outline of the case was supplied to me; but as it occurred at a distance, and I was not directly in communication with the owner of the calves, it is not quite so full as it might otherwise have been.

To each of twenty-four yearling calves was given one ounce of powdered black antimony, in a horn of urine. This was at 9 a.m., and the same evening one calf died, the whole of them being seriously ill. At varying intervals

* Fleitmann, on Berberine, 'Chemical Gazette,' 1847, vol. v. p. 129, etc.

up to ten days, further deaths occurred, until ten animals had succumbed. The others ultimately recovered. The symptoms were great cramp, constipation, and falling off of the hair. In two cases, *post-mortem* examinations were made, and great irritation of the mucous coats of the stomach was found.

Analysis.—The powder was boiled with water, but neither arsenic nor any other matter was dissolved. To determine the sulphide of arsenic present, the process of Wackenroder was adopted (Fresenius). Twenty grammes are deflagrated with forty grammes of nitrate of potash and twenty grammes of carbonate of soda, by projecting the mixture gradually into a red-hot Hessian crucible. The resulting mass is lixiviated with water, filtered, the filtrate acidulated by hydrochloric acid and sulphurous acid added, after which sulphuretted hydrogen is passed through it. The moist precipitate is digested with carbonate of ammonia, filtered, acidulated, and precipitated as tersulphide of arsenic. This method is not rigidly accurate, as traces of either sulphide of antimony or of free sulphur may contribute to give too high results.

I give below the results obtained with four distinct specimens of sulphide of antimony:—

No. 1	contained	sulphide of arsenic	1·33	per cent.
2	,,	,,	·27	,,
3	,,	,,	1·16	,,
4	,,	,,	·25	,,

Thus it appears that No. 1 (that given to the calves) contained far more arsenic than did some other specimens, amounting to 5·84 grains of tersulphide in an avoirdupois ounce, being the dose which proved fatal.

The dose of black antimony may be considered unreasonably large, but I know of no grounds for supposing that the antimony produced the mischief. Large doses of this substance are constantly given to animals. Pereira speaks of doses of two to four ounces being given to horses, and of half an ounce taken by a man for several days without bad effect.

It appears, then, that the arsenic present was the cause of mischief. The dose of pure sulphide of arsenic has not been determined, and it has often been regarded as comparatively inert. This is doubtless correct, as long as it retains its insoluble condition. *Medicina non agunt nisi soluta.* But, singularly enough, in selecting urine as a vehicle for dosing the calves, their owner was providing for the solution and prompt absorption of the sulphide of arsenic. When it was dissolved by the ammoniacal urine, its poisonous properties would probably be just as great as those of a similar quantity of arsenious acid in solution.

Gmelin gives a process for purifying commercial black antimony from arsenic, by digesting the powder with twice its weight of aqueous ammonia for forty-eight hours with stirring, then filtering, and washing the product, which is almost entirely freed from arsenic. This method may become of some practical importance. One of the principal makers of emetic tartar informs me that the black antimony lately in the market has been much more contaminated by arsenic than was formerly the case, and that it causes much trouble with the mother-liquors.

Impurity may exist to a much greater extent than that now recorded. Thus, Gmelin quotes Serullas to show that all German and French black antimony, excepting that of Montluçon, contains from 1·6 to 5·0 per cent. of arsenic.

It is evident that those who may unwittingly vend the contaminated samples incur the risk of being held responsible for results.

So long as sulphide of arsenic is present, and its noxious or innocuous

quality depends upon the nature of the fluids with which it meets in the stomach, there will be a very disagreeable uncertainty about the use of the crude drug.

REPORT OF THE RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATIONS AND OF THE APPPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On the Chemical Composition of Magenta.—Several different chemists have undertaken the examination of the new colouring matter derived from aniline, and known as Fuchsine or Magenta, with the view of ascertaining its chemical composition and constitution. The results hitherto obtained, however, have been so discordant as to lead to nothing satisfactory. The principal obstacle to success which encountered these experimenters appears to have been the difficulty of procuring the colouring matter in a state of absolute purity, and the readiness with which its properties are masked by the presence of the smallest quantity of foreign matter. Mr. E. C. Nicholson, of the firm of Messrs. Simpson, Maule, and Nicholson, the principal manufacturers of magenta in this country, has however devoted himself to the production of this substance in the pure state, and, from the ample resources at his command, has succeeded in preparing a complete series of perfectly definite compounds in beautiful crystals. The first difficulty being thus overcome, these products were placed at the disposal of Dr. Hofmann, and the results of this distinguished chemist's investigation are now published.

The colour magenta, then, consists of a salt, usually the acetate, of a new base or alkaloid, for which Mr. Nicholson proposes the name of *Roseine*, but Dr. Hofmann, wishing to preserve a remembrance of its origin, christens *Rosaniline*. It is a remarkable property of this substance, that, while all its compounds possess the magnificent characteristic colour of magenta, it is itself colourless. The pure base may be prepared from the acetate, which is the compound generally used in dyeing, by decomposing a boiling solution of the salt with a large excess of ammonia. A crystalline precipitate of a reddish colour is thrown down, which consists of the base in a state of great purity. The colourless liquid filtered from the precipitate yields, on cooling, a crop of *perfectly white*, needle-shaped or tabular crystals: these consist of absolutely pure rosaniline. Unfortunately, the extent of solubility of this substance in ammonia, or even in boiling water, is very slight, so that only a very small quantity of the base can be obtained in this absolutely colourless condition. Rosaniline is a little more soluble in spirit; the solution possesses a deep red colour. It is insoluble in ether. Exposed to the air the base becomes rapidly rose-coloured, and ultimately deep red. During this change of colour no variation of weight can be perceived. At 100° C. rosaniline loses a little adherent water, and may then be heated to 130° C. without change; at a higher temperature it decomposes, giving off an oily liquid, principally aniline, and leaving a carbonaceous residue. The analysis of rosaniline led to the formula:—*

$$C_{40}H_{21}N_3O_2 = C_{40}H_{19}N_3,2HO.$$

which was confirmed by the examination of its salts and characteristic combinations. Rosaniline constitutes a powerful well-defined base, forming several series of salts, all remarkably crystalline. Dr. Hofmann regards it as a triacid triamine, which is capable of producing three classes of salts—

$$C_{40}H_{19}N_3,HCl$$
$$C_{40}H_{19}N_3,2HCl$$
$$C_{40}H_{19}N_3,3HCl.$$

At present, however, he has only succeeded in producing the first and last salt; and

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*Dr. Hofmann, using the new equivalents C=12 and O=16, writes the formula—

$$C_{20}H_{21}N_3=C_{20}H_{19}N^3,H_2O.$$

the great tendency of the base appears to be to form monacid compounds. The salts, with one equivalent of acid, are extremely stable; they may be crystallized four or five times without in the slightest degree changing. The salts, with three equivalents of acid, have only a slight stability, and are decomposed by the action of water, or a temperature of 100° C. From the formula of the hydrochlorates, it is evident that the white crystals of the base really constitute a hydrate, the salts not containing oxygen.

The mono-salts of rosaniline may be obtained in two ways, either by direct combination with the several acids, or by boiling the pure base with an ammonia salt of the acid. The two methods furnish equally pure salts. The salts with one equivalent of acid, for the most part present by reflected light the green lustre of cantharides' wings. Viewed by transmitted light, the crystals are red, and in large mass almost opaque. The aqueous or alcoholic solutions of these salts possess the magnificent crimson colour so well known.

The tri-acid salts, on the contrary, are of a yellowish brown, both in the solid state or in solution, and they are much more soluble in water and alcohol than the mono-acid salts, which are comparatively but slightly soluble.

The mono-hydrochlorate of rosaniline may be prepared either by combining the base with hydrochloric acid, or by boiling it with sal-ammoniac. It deposits from its boiling solution in well-defined rhombic tables, often united into the form of a star. It is difficultly soluble in water, more soluble in alcohol, and insoluble in ether. It is very hygroscopic. This compound is more soluble in moderately-diluted hydrochloric acid than it is in water. If the slightly warm solution is mixed with very strong hydrochloric acid, it solidifies on cooling to a mass of magnificent needle-shaped crystals of a reddish-brown colour, which must be washed with concentrated hydrochlorid acid, and dried over oil of vitriol and lime. These crystals constitute the terhydrochlorate, $C_{40}H_{19}N_3$, 3HCl. Water decomposes this salt. Heated to 100° it gradually loses its acid; the brown crystals become first of an indigo-blue colour, and if heated long enough, pass to the original green mono-salt. The sulphate of rosaniline is easily obtained by dissolving the base in dilute boiling sulphuric acid. It forms green crystals like the chloride. The acetate is perhaps the most beautiful of the series. Mr. Nicholson has obtained it in crystals a quarter of an inch thick. It is the most soluble in water and alcohol.

Action of Reducing Agents on Rosaniline.—From rosaniline Dr. Hofmann has succeeded in obtaining another basic substance of a very definite nature, to which he gives the name *Leucaniline*. It is obtained by the action of reducing agents, either nascent hydrogen or sulphuretted hydrogen, upon a salt of rosaniline—the readiest method for its production being to digest commercial fuchsine or magenta, with sulphide of ammonium, for some time. A fused mass results, which solidifies on cooling to a brittle scarcely crystalline body, which consists of leucaniline. The mass is powdered, washed with water, and dissolved in dilute hydrochloric acid, to separate the sulphur and impurities. Concentrated hydrochloric acid is added to the deep brown solution so obtained, when a crystalline precipitate is thrown down, which is washed with strong acid, and may be further purified by again dissolving in dilute acid, heating the solution to the boiling point, and then adding strong acid; the liquid remains clear, and as it cools the chloride of leucaniline separates in crystals. These are rectangular tables, well formed, but very small, and of a dazzling white colour. They may be recrystallized from water, or dissolved in alcohol, and precipitated by the addition of ether, in which they are perfectly insoluble. The pure chloride furnishes, on the addition of ammonia, leucaniline as a perfectly white powder, which assumes a rose colour by exposure to the atmosphere of the laboratory. It is scarcely soluble in water, very soluble in alcohol, and scarcely so in ether. It cannot be obtained in fine crystals from these solvents. When heated it becomes red, and at 100° C. fuses to a red transparent liquid. It is anhydrous, its formula being—

$$C_{40}H_{21}N_3.$$

Its chloride is tri-acid, and when dried *in vacuo* retains one atom of water. Its formula is $C_{40}H_{21}N_3$, 3HCl + 2HO. It furnishes a beautiful and very crystalline platinum salt having the composition $C_{40}H_{21}N_3$,3HCl,$PtCl_2$ + 2 HO.

The salts of leucaniline are in general well crystallized; they are all very soluble in

water, and are precipitated from their aqueous solutions upon the addition of their respective acids. The sulphate is remarkable for the facility with which it crystallizes. It will be seen, by comparing the formula of leucaniline with that of rosaniline, that it only differs from the latter by containing two atoms more of hydrogen :—

Rosaniline — $C_{40}H_{19}N_3$
Leucaniline—$C_{40}H_{21}N_3$

Dr. Hofmann therefore compares these two bases to blue and white indigo, which, as is known, only differ from each other by two atoms of hydrogen.

Leucaniline is easily changed back again into rosaniline by oxidizing agents. The reaction succeeds perfectly with peroxide of barium, perchloride of iron, or chromate of potash. On carefully heating the colourless solution of the chloride with one of these agents, the liquid rapidly assumes the beautiful crimson colour of the salts of aniline.

On the Association of Rubidium with Potassium in Nature.—M. L. Grandeau has been engaged in some researches on the dissemination through nature of the two new metals recently discovered by Bunsen. He has, in the course of this investigation, submitted to a quantitative examination the residues obtained from the Government saltpetre refinery of Paris. None of these residues and mother-liquors were found to contain cæsium, but they yielded rubidium in the following approximate quantities :—One kilogramme of the crude residues obtained in 1861 furnished 2·13 grammes of chloride of rubidium. One kilogramme of residues from 1862 gave 2·92 grammes. One kilogramme of the mother-liquors of 1862 furnished 3·02 grammes. These determinations were made by drying and calcining about two kilogrammes of the crude product, then dissolving twenty to thirty grammes in water, acidulated with hydrochloric acid, filtering the solution, and precipitating with chloride of platinum. The precipitate was washed with alcohol and weighed, then washed with boiling water, observing the precautions indicated by Bunsen, until the salt gave no perceptible indications of potassium in the spectrum apparatus.

Struck with the large amount of rubidium in these residues, M. Grandeau sought to ascertain the source from which it was derived. He found that for many years past all the saltpetre at the refinery had been made from native nitrate of soda and indigenous chloride of potassium. Messrs. Kirchhoff and Bunsen have already announced that nitrate of soda is entirely free from cæsium and rubidium, and M. Grandeau has himself also verified the fact. The chloride of potassium used in the manufacture is principally obtained from the beet-root. M. Grandeau therefore submitted to analysis the salts and mother-liquors from this source :—One kilogramme of the salts yielded 1·87 grammes of chloride of rubidium ; and one kilogramme of the last mother-liquor gave 4·70 grammes. It appears very probable, therefore, that the rubidium found in the saltpetre residues was derived exclusively from the beet-root. This plant then possesses, in a remarkable manner, the power of removing this metal from the earth, where it exists in such minute quantities as to defy detection even by the spectrum, and accumulating it in its tissues.

On the Preparation of Asparagin.—M. Buchner indicates the facility with which asparagin may be prepared by the new process of dialysis. A thick viscous mucilage of the marsh mallow (*Althæa officinalis*) is put into the dialyser with distilled water on the exterior. After two days the water is changed ; the first diffusate contains almost the whole of the asparagin, and by simple evaporation over a water bath yields fine crystals.

THE GRANULATION OF MEDICINES.

BY THOMAS SKINNER, M.D.

"By the application of art, it is intended that medicines should be rendered more agreeable, more convenient, more safe, and more efficacious than they are in their natural state. To obtain these ends is the intention of Pharmacy." (*Duncan's Elements of Therapeutics*, 1773, vol. i.)

In furtherance of the above elegant and forcibly expressed ideas of Duncan, I beg

to submit the following as an addition, if not an improvement, to the *methodus medendi:* namely, the *Granulation of Medicines.*

In an admirable paper by Dr. Henry Kennedy, of Dublin, which appeared in the pages of the *Dublin Medical Press*, and an abstract of which appeared shortly afterwards in the first volume of this year's 'Journal' (p. 524), it is laid down by him as an axiom in therapeutics, that the form of powder "*is the most efficacious in which a medicinal substance can be administered.*" Having always entertained the same opinion, I have frequently thought of some method which would render powders more easy of deglutition, and less offensive to the senses of taste and smell. It at once occurred to me that the granular form, with sugar or gum as the excipient, would suit the purpose; but how to obtain the granular form without having recourse to the art of the confectioner, or without the aid of an excessive amount of heat, sadly puzzled me. On explaining my difficulties to Mr. Samuel Banner, an enterprising chemist in this town (Liverpool), and at the same time informing him that the French pharmaceutists had a form of medication which they call "poudres granulées," the process of preparing which consisted in enveloping the particles of medicines in syrup by means of heat and constant stirring, as in the art of making comfits, he at once suggested a very simple plan, by means of which almost every medicine capable of assuming the form of powder may be granulated of a firm consistenee; a process which demands little or no aid from heat; which requires very little moisture, and which results in a granular powder that may be laid upon the tongue and washed over the throat by means of water, without leaving a trace of a medicinal substance, or the slightest sensation to indicate its recent proximity to the peripheral extremities of the gustatory and olfactory nerves. The process is a modification of the method of granulating gunpowder.

Method of Preparing the Granules.—The first requisite is a thoroughly good material; to obtain which, it is necessary that all powders, previously to their being converted into granules, should be fresh and of the best quality. As regards pulverization, it may be as well to observe, that in order to form granules it is not necessary that the powder should be impalpably fine; a coarsely ground powder being quite as easily granulated as an impalpable one, and the resulting granule being quite as efficacious, if not more so, for reasons which will hereafter appear.

1. *Making the Mass.*—The powder is to be placed in a Wedgwood mortar, and sufficient mucilage of gum arabic, of the London or Edinburgh *Pharmacopœia* strength, is to be gradually added until a mass is made, of such consistence that it will with difficulty keep together, and which will readily crumble; at the same time, it must be so unadhesive as not to stick to the meshes of the sieves aftermentioned. There are few practical chemists having experience in pill-making who will not understand the required consistence. Or the powder may be made into a mass of the consistence of a dry paste, with the mucilage, rolled into flat thin cakes, and dried in a water bath, at a low temperature, or in a current of dry air. The cakes are then to be coarsely powdered or bruised in a mortar, when they will be ready for the next part of the process. (The last method is always preferred where it can be adopted.)

2. *Granulating and Sifting.*—Three sieves will be required, of different degrees of coarseness; namely, twelve, sixteen, and twenty meshes to the inch, which may be called respectively, Nos. 1, 2, and 3. They are to be so fitted together that No. 1, the coarsest, shall be at the top; No. 2 next, and No. 3, the finest, lowermost. The mass being ready, and of the required consistence, it is to be rubbed through the top sieve with the open hand; the sieves, still fitted together, are to be shaken about as in sifting. This part of the process being terminated, it will be found that granules of the largest size are between sieves Nos. 1 and 2; the smaller between Nos. 2 and 3; and the "waste" below No. 3, either on paper or on a leather or parchment "drum." This waste is to be re-damped, re-formed into a mass, and passed through the same process. If the mass has been formed into cakes and bruised, the *débris* is simply passed through the series of sieves as in ordinary sifting. The waste is redamped with simple water, re-formed into thin cakes, dried, bruised and resifted.

N.B. The different sizes of granules are never mixed, but kept separate for dispensing.

3. *Drying, Coating, and Waterproofing the Granules.*—The two sizes of granules are to be kept apart; those prepared by the caking process require no drying; the others should be spread out on paper to enable them to dry spontaneously; or, if they

contain no ingredient which might be volatilized or otherwise acted upon by heat, such as charcoal, etc., they may be placed in a hemispherical copper pan, which must be kept in constant motion over a gas stove until the granules are dry. They may also be speedily dried in a current of dry or hot air with occasional stirring. When perfectly dry, they are placed in a mortar of convenient size, and a sufficient quantity of a strong tincture of tolu (℥iij to ℥i) with or without musk, rose, etc., is added to them, until by constant stirring all the granules appear to be glossy and shining. They are then again put through the drying process, keeping them in constant motion.

Granules well prepared by the above process are very compact, and, to some extent, they are insoluble in cold water; a desideratum, as they may be conveniently administered in that, the best of all vehicles, without imparting to the water the slightest taste, smell, or colour. It may be well here to remark, that the quantity of gum in the average of granules is computed at one-sixteenth by weight; a quantity so small as not to affect the usual doses of powders. The quantity of balsam of tolu is so small as to be totally unworthy of notice.

Method and Apparatus required for preparing small quantities of Granules.—For preparing small quantities, one wire sieve, about twelve meshes to the inch, eight inches in diameter (worth about eighteenpence), a little muslin, and an ordinary small brass pan, such as is to be found in every house, will be all the apparatus that is required. The foregoing directions on the large scale will be a sufficient guide.

Pulverization, etc.—In treating of the advantages of granulation, it is necessary to take into consideration certain objectionable practices which universally obtain in the trade of drug-grinding. In the first place, I do not think that the trade is to blame in the matter; it is the fault of those, namely ourselves, who demand of the drug-grinder an impalpable powder in almost every instance of the pulverization of a drug. Now, an impalpable powder is all very well where charcoal and such like substances are concerned; but with cubebs, opium, rhubarb, spices, and a variety of similar medicinal substances, an impalpable powder cannot be obtained without considerable loss, as well as certain damage to their active principles. In order to obtain an impalpable powder, all drugs have first to go through the drying process, which is generally effected in a room heated to about 120° F., by means of a stove or steam pipe. (Mohr and Redwood's *Practical Pharmacy*, 1849, p. 238.)

The authorities whom I have just quoted state, that the principal, if not the only necessary cause of deterioration, in the product in the process of drug-grinding, is the long continued application of heat to which the drugs are exposed in the drying-room. "The strong smell which fills the drying-room when opium, or myrrh, or cinnamon are under operation, affords sufficient evidence that some volatile matter besides water is escaping, and that the resulting powders cannot strictly represent the drugs from which they are made. Thus, myrrh, valerian, cardamoms, cinnamon, and spices generally, lose some of their efficacy in being reduced to fine powder." (*Op. cit.*, p. 241.)

Again, without taking into consideration the fact of the wholesale adulteration of drugs; of the errors of omission and commission which occur through mistakes in the botany of our Materia Medica, let me for one moment allude to the conventional practice of the trade, in reference to the allowance for loss of product during the process of drug-grinding; namely, the system of making a uniform allowance for loss of weight in grinding, whatever the nature or quality of the drug might be.

Messrs. Mohr and Redwood, after quoting a table taken from the experience of Messrs. S. and G. Allen, showing the loss sustained in grinding forty-two different drugs, state:—"It appears from this table that the average loss in powdering drugs is more than 4 per cent. (the percentage returned in every instance by the London drug-grinders, except in grinding such substances as cream of tartar and sulphuret of antimony, where they only allow 2 per cent.) in nearly all cases, and that in some it is considerably more. Now, can it be reasonably supposed that, in these cases, the drug-grinder will supply good rhubarb or jalap, gentian or ginger, for the water which has been imbibed in a damp warehouse or cellar? He is required to make up a certain quantity of powder, evidently more than the crude drug produces, but how is he to do it? Does he keep a stock from which to supply deficiencies of all the drugs he grinds, and go to market and purchase more when his stock is exhausted; or is there some magical power in his mill?" (p. 246.) The same most excellent authorities inform

us that—"Instead of water, sawdust is used for cleansing the drug-mill. After grinding any drug, in order to remove the adhering particles from the mill, sawdust is ground until the mill is rendered sweet and clean. Sawdust, then, is indispensable at a drug-mill, as necessary as water is in a druggist's shop, and if the druggist sends damp jalap, containing 15 per cent of water, to be ground, and requires dry powder to be returned, with only 4 per cent. of deduction for loss, he adopts a conventional method of asking for some of the *rinsing of the mill*—a veritable 'powder of post.'" By this practice the weakest and most worthless of drugs are rendered still weaker; besides, as it sanctions the practice of admixture, and affords facilities for those, who are so disposed, to pursue a ruinous competition in price at the sacrifice of quality, any means which will assist in removing so gross a system—a system which not only ruins our own reputations, but which is prejudicial to the advancement of our beloved science—must be hailed and welcomed. The granulation of powders I look upon as such a means.

Advantages of Granulation.—As I have before stated, it is not at all necessary, except in the instance of charcoal and a few other substances, that the drug should be reduced to an impalpable powder; a coarse or moist powder being quite as easily granulated as an impalpable one, if not more easily; and I am quite convinced from experience, that the secretions of the alimentary canal act on and are reacted upon by the active principles of the granules made from a coarse powder, quite as effectually, and in the same amount of time, as when the granules are prepared from an impalpable one. This being the case, and as the process of granulation from the first requires very little or no heat during any stage of the process, I repeat that I think it bids fair to remove the 4 per cent. system; to lessen the amount of loss of the active ingredients of drugs caused by the present demand for impalpable powders; and to give us the crude material unaltered, in a form most easy of deglutition and always ready for infusion in nature's own digestive apparatus, the living human stomach.

By the process of granulation, the active principles of medicines are not only prevented from loss by evaporation or decomposition *during* their preparation, but, every particle being enveloped as it were in a pellicle of gum, and a number of these particles being aggregated together, when they become dry, powerful contraction takes place, rendering them very compact, and capable, if kept dry, of preserving their active principles for an almost indefinite period *after* they are prepared. The coating of tolu renders them inaccessible to the ordinary moisture of the atmosphere, and, to some extent, to any cold liquids in which they may be taken. With the exception of extracts, the form of granulation contains much more of the active ingredients of medicines, bulk for bulk, or weight for weight, than any of the other forms of medication. On this and on other accounts, most of the saline and irritating caustic remedies will necessarily be exceptions to the form of granulation, that of solution being their only legitimate form of administration.

Lastly, as all the various officinal and other pill-masses are capable of being as easily granulated as powders, it is not improbable that, to some extent at least, pills may become an all but obsolete form of administering medicines. By granulating pill-masses, they are much more certain and rapid in their action; the dose is much more easily apportioned, and still more readily dispensed. When it is considered how difficult it is to get children and young people to take a pill, and how next to impossible it is for some adults to swallow them, the granulating of pill-masses, whether officinal or not, will, I have little doubt, become a matter of imperative necessity.

Speaking of the *poudres granulées* of the French school of pharmacy, Soubeiran has applied the epithet "Citò, tutò, jucundè;" which words, Bouchardat states, "contiennent en germe toute une révolution dans la pharmaccutique. Cette révolution, il faut le dire, est déjà en partie accomplie." If so much can be said in favour of the *poudres granulées*, with equal justice, I think, the same may be said of the process of granulation so happily thought on, and so well carried out by Mr. Banner.

Doses and Mode of Administering Granules, etc.—As the quantity of gum is only one-sixteenth, it has not hitherto been thought necessary to alter the ordinary officinal or recognized doses of powders. Unless they contain poisonous ingredients, there will be no necessity to alter the dose. As it stands, the mistake is certain to be on the safe side. Granules may be prescribed or dispensed by weight in separate powders or

in bulk. If in bulk, say by weight from one to four ounces; and the direction may be worded, a teaspoonful or a saltspoonful twice or thrice daily, before or after meals, as the case may be.

A modern teaspoon and saltspoon are useful and convenient measures for apportioning the doses of most granular powders. As a rule, a teaspoon holds double the quantity of a saltspoon, thus one teaspoonful (unheaped) of charcoal granules equals fifty grains, whilst a saltspoon holds twenty-five grains. Granules of Gregory's powder (compound rhubarb powder) are seventy grains to the teaspoonful, or thirty-five grains to the saltspoon. These two medicines may be looked upon as a very fair average of most granules formed of vegetable and other light powders. More active ingredients should be prescribed as separate powders.

Officinal or not, compound powders may be kept on stock, or they may be dispensed from the various individual granules *of the same size* as that of which the compound powder is made up; but they cannot, any more than extempore granular powders, be made at the time of dispensing without great inconvenience and loss of time to the dispenser, unless some simple and more expeditious plan is found out. So far as Mr. Banner's establishment is concerned, no additional charge is made for granules over ordinary powders.

The following modes of administering granules have been adopted by my own patients, some preferring the one method and some the other, according to taste or fancy, I suppose.

1. Place the dose of granules on the tongue, take a little water into the mouth, and swallow them over with the water. Some prefer to moisten them with the water in the mouth, previous to swallowing; a very useful precaution, as it is extremely difficult to swallow anything that is dry. 2. Others put the granules into a wine-glass, full or half full of water, quickly stir them round and swallow them while suspended, *secundum artem*. This latter method, I think, is the best; there is no taste, colour, nor smell communicated to the water, if it is done quickly. In fact, this form of medication renders powders, hitherto the most unpleasant of all forms of medicine, the most elegant and agreeable.

In conclusion, I cannot resist the temptation to make a few remarks on two granular powders, namely, charcoal and ergot of rye. The former of these substances I look upon as a most invaluable medicine; but on account of its colour and the difficulty hitherto experienced of rendering it at all agreeable to swallow, it may be said to have become obsolete. In 1856, I remember a box of charcoal biscuits which used to be shown at the table of Professor Simpson, as the latest pharmaceutical curiosity, and which was sent to him from London as a specimen of an *elegant* form of administering charcoal in dyspepsia. The appearance of the biscuits may have *produced* the affection in some of the curious-lookers on, but I am certain that the charcoal stood a poor chance of *curing* it, as I never saw any one who dared to venture beyond a nibble at the foul intruder. Granulated charcoal in doses of a saltspoonful or teaspoonful, at bedtime, or twice or thrice daily after meals, will be found to be as readily taken as any medicine we possess.

As to ergot of rye, I do not think that we have any reliable preparation, particularly one that will keep. Moreover, I have long been convinced that the *liquor*, as prepared by the very best of chemists, does not contain all the active ingredients of the fresh powder, much less is one fluid drachm of the *liquor* equal to one drachm of the fresh powder, because I have often given at one dose as much as six drachms of the *liquor* as prepared by Messrs. Duncan and Flockhart, and Messrs. Clay and Abraham, the leading chemists in Edinburgh and Liverpool respectively, without producing uterine action or *sickness or vomiting*, the idiopathic symptoms of a full medicinal dose of ergot or its active principle; whilst I have never given two drachms of the *fresh* powder without producing *nausea or sickness* and powerful uterine contraction during or after labour, except where there existed complete *inertia uteri*, arising from disease, from innate weakness, from excessive loss of blood, or from dangerous exhaustion, under all of which circumstances I should never rely upon or have recourse to the exhibition of ergot.

Believing, as I have stated, that no liquid preparation hitherto introduced is really equal to the fresh powder made by one's own self in its medicinal effects, and, know-

ing by experience, that the powder does not keep well, I venture to affirm, that the granules of a fresh specimen of any good season's ergot will be found to be the best preparation of the drug, as regards keeping, ease of administration, and certainty of effect; I shall only add, that as the powder of ergot is subject to the same mishaps from the *rinsings of the mill* as other powders, I would strongly recommend those of my professional brethren who desire to possess a reliable form of this important and useful drug, to get the present season's ergot from Butler in Covent Garden Market, to powder it themselves, and make it into granules as directed, or order the same through any respectable chemist. If this advice is followed, I feel confident there will be less fault to be found with ergot and fewer cases of its failure recorded, in cases where such an agent is at all likely to act with effect.

In administering ergot in granules, the smallest size is preferable, as they are more quickly dissolved in the stomach. The dose is a saltspoonful or more.*

THE LITHIA SPRINGS OF BADEN-BADEN.

BY J. ALTHAUS, M.D., M.R.C.P.

The salts of lithia, into the pharmaceutical properties of which Lipowitz and Mr. Alexander Ure were the first to inquire, have recently been prominently brought under the notice of the medical profession by Dr. Garrod, who recommends them in cases of uric acid diathesis connected with gravel, and in cases of chronic gout. This recommendation is based upon the fact that lithia possesses a great affinity to uric acid, and that the urate of lithia is the most soluble of all the urates.

Lithia is especially found in the lepidolite, a kind of mica which occurs in the granite of Bohemia, and from which it is prepared in chemical manufactories. From one of these fabrics, about forty pounds of carbonate of lithia are annually sent to this country, where the salts of lithia are now so much in demand that they can scarcely be supplied in sufficient quantities. The amount of lithia which had been found in mineral waters up to the present time, was very trifling; and it was the great rarity of this substance which prevented Mr. Ure from following up his researches on it. Quite recently, however, Professor Bunsen, of Heidelberg, has shown, by a new method of investigation, that lithia is, indeed, a substance which is most universally encountered in Nature. It is well known that many substances, when introduced into a flame, have the property of imparting to the spectrum of the flame peculiar and brilliant rays, which are especially striking when the heat of the flame is very great, and its light insignificant. Upon this fact the Professor of Heidelberg has based a method of qualitative chemical analysis, which has considerably enlarged the domain of chemical investigations, and has allowed to solve problems which were hitherto believed to be unapproachable. By means of this method, Professor Bunsen discovered in the mineral springs of Dürckheim two new metals, to which he has given the names of Cæsium and Rubidium, which are closely related to potassium, and are the most electro-positive substances known. Concerning lithia, the same philosopher found that its compounds give rise to two quite distinct rays, one of which is of a feeble yellow, and the other of a very brilliant red. By this method $\frac{1}{100000}$ of a milligramme of carbonate of lithia may be distinctly traced, and one-fourth of a grain of the same salt causes the red ray to continue for a whole hour. The nature of the compound in which the metal exists, has no influence upon the position of the rays in the spectrum, it being the same with the chloride, the bromide, the iodide, the carbonate, the sulphate, the phosphate, and the silicate of lithia; but the intensity of the rays increases in proportion to the volatility of the compounds. Professor Bunsen has by this means discovered lithia, not only in triphylline, triphane, and petalite, but also in a large number of feldspaths, in the granite of the Odenwald, in a common spring at Sehlierbach near Heidelberg, in sea-water, in fucus which had been carried by the Gulf-stream to the shores of Scotland, in the ashes of tobacco, of grapes, of vine-leaves, of grain of

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* For the process of making the granular Effervescing Preparations, see vol. i. (2nd series), page 301.

every description, of the milk of animals which had been fed upon grain, etc. Lithia has also been discovered in the ashes of the human blood and muscles. A very large quantity of it was found in two of the thermal springs of Baden-Baden, namely, the Fettquelle and the Murquelle, of which the former contains 0·2315 grains of chloride of lithia in sixteen ounces of water, and the latter 2·3649 grains of it. In one hundred pounds of the salt extracted from the Murquelle nine and three-quarter pounds of lithia are contained; that is, a quantity of this substance worth £90 sterling. This amount is not equalled by that contained in any other mineral spring which has yet been examined.

In consequence of the analysis of these springs, made by Professor Bunsen, they have, during the last season, for the first time been extensively used in cases of gout and lithiasis; and I am indebted to my friend Dr. Ruef, of Baden-Baden, who has treated a large number of cases of that description with them, for the following particulars regarding the result of their administration.

The physiological effects observed after taking the waters are as follows:—At first it promotes digestion, and a feeling of well-being is induced; but after they have been taken for some time, and especially in large doses, sickness, disposition to vomiting, and diarrhœa ensue, which in most cases, however, gradually disappear, but sometimes continue as long as the water is drunk. A constant effect is an increased elimination of urine, the quantity of which is often doubled, or even trebled; it becomes turbid after some time, and large quantities of a reddish sediment are deposited in it. In some of the patients treated by Dr. Ruef, profuse perspiration came on after from five to ten days, and continued as long as the water was drunk; in the case of a lady who had not freely perspired for years, this perspiration even continued two months after the cure had been finished. It therefore appears that the water is a diuretic as well as a diaphoretic.

Concerning its therapeutic action, in almost all cases the pain in the joints increased at first (especially in those patients who were in the end cured) to a rather high degree, but it never spread to healthy parts. In joints which were perfectly contracted, crackling, dragging, and pulling were felt, as if the articulation were being torn asunder; but after such an attack of pain, a sensation of easiness and decided improvement was felt, and the mobility of the limb was much increased. In one patient, a physician from Epernay, a regular fit of gout came on during the use of the water, under the continued use of which this patient so rapidly improved, that he could walk about again after three days.

Gouty affections of the joints, of the sheaths of the nerves and the muscles, if not of very long standing, were cured after three or four weeks, and have remained so up to the present moment. In periodically recurring headache on one side, which is often due to gout, the effects were also very beneficial. A lady who had been contracted for fourteen years, and who could neither stand, nor walk, nor carry a spoon to the mouth, was by the use of this water so much improved that she was able to walk a little, and to stand and eat by herself, while no former medication had relieved her. This patient also suffered from dysmenorrhœa, the most prominent symptoms of which were severe abdominal pain, oppression and asthma, cold and paralysis of the left arm. She had only taken the lithia water for eight days when the catamenia appeared, and were unaccompanied by any unpleasant symptoms whatever; nor did these latter reappear afterwards. In a male patient whose finger-joints were infiltrated with urate of soda, which was visible in white specks through the skin, these infiltrations were removed, and the swelling diminished.

The mode of administering the water was as follows:—For patients with whom large quantities of water do not agree, five grains of the carbonate of lithia were added to a bottle of the water of Murquelle, which contains five grains of chloride of lithia; and the water was then impregnated with carbonic acid, in order to render the carbonate more soluble. Of this water a tumblerful was drunk three times a day; and if an increase of the dose appeared necessary, two or three grains of the carbonate were added to every glass. If patients are able to keep much water on their stomach, they may take six or eight tumblersful of the Murquelle, without any artificial addition of carbonate of lithia. Baths with water of the same spring were also given; and the Administration of the Spas of Baden-Baden are now occupied in preparing a mother-

lye from the water of the Murquelle, in order to gain so much of the salt that it may next year be added to the baths. Of all the antarthritic remedies offered by the springs of Baden-Baden, none have proved so beneficial as this lithia spring. Dr. Ruef has, in some cases, at the same time employed the Russian vapour-baths prepared from the steam of the hottest spring of the place, which has a temperature of 155° F.—*Medical Times and Gazette.*

ON THE PREPARATION OF MENYANTHINE, AND ON THE ESSENTIAL OIL OF LEDUM.

BY MM. KROMAYER AND FROEHDE.

The best agent for separating the bitter principles of plants from solutions containing them, is said by M. Ludwig to be tannin, first employed by MM. Homolle and Quevenne, and successfully applied by M. Walz, to the separation of colocynthine, bryonine, gratioline, convallamarine, etc., and by M. Kromayer, to the preparation of absinthine and menyanthine. For the preparation of the latter, the buckbean plant (*Menyanthes trifoliata*) is exhausted by hot water, and the liquid, slightly concentrated by evaporation, is mixed with an infusion of galls till it ceases to precipitate. The precipitate is mixed into a paste with oxide of lead, finely divided by decantation, and evaporated to dryness in the water-bath. The mass is powdered and boiled with alcohol of 85 per cent., the solution filtered, most of the alcohol distilled away, and the residual liquid in the retort again filtered, and set aside to evaporate spontaneously. The menyanthine separates as a brown mass; it is washed with water, and treated with ether, which dissolves out a green resinous matter of an acrid taste.

The insoluble portion, which is the impure menyanthine, is dissolved in hot water, and precipitated by tannin; the white precipitate is well washed and dissolved in alcohol, the solution mixed with oxide of lead, and again dried on the water-bath. The residue is powdered, exhausted with boiling alcohol, the solution filtered whilst hot, then treated with animal charcoal, and filtered again. A little water is added to the colourless filtrate, and it is then allowed to evaporate spontaneously; the menyanthine deposits as a white powder, which must be dried over oil of vitriol.

This principle is uncrystallizable, very bitter, and without action on vegetable colours. The author assigns to it the formula $C_{44}H_{36}O_{22}$ which is also that of pinipikrine, obtained by him from the cones of the *Pinus sylvestris*. The products of decomposition of these two principles also appear identical; both glucosides, they furnish by ebullition with dilute sulphuric acid a fermentable sugar and an essential oil. The oil from menyanthine has an odour of bitter almonds, and appears to be identical with the oil obtained by the author from pinipikrine, and called by him Erinicol, $C_{20}H_{16}O_2$.

Erinicol has also been obtained from the essential oil of the *Ledum palustre*. This oil contains in addition another essential oil, having the same composition as oil of turpentine, and boiling at 160° cent. It also contains acetic, butyric, and valerianic acids, and a peculiar odoriferous oily acid, called Ledumic acid, and having the probable formula $C_{16}H_{10}O_8$.

The essential oil, analogous to oil of turpentine, has been treated with potash by M. Frochde, who has thus separated an oily body possessing in a high degree the odour of the oil of Ledum. In composition it is isomeric with ledumic acid, from which however it differs in properties. It appears to be identical with the ericinon ($C_{16}H_8O_6$) of Uloth. Ericinin bears the same relation to ledumic acid that conmarin does to conmaric acid.

$$\text{Conmarin} — C_{18}H_6O_4 + 2HO = C_{18}H_8O_6 \text{ — Conmaric acid.}$$
$$\text{Ericinon} — C_{16}H_8O_6 + 2HO = C_{16}H_{10}O_8 \text{ — Ledumic acid.}$$

—*Journal de Pharmacie et de Chimie.*

ON THE COMPOUND OF IODATE AND IODIDE OF SODIUM.

BY M. RAMMELSBERG.

This compound was obtained by the author twenty years ago; he has since shown that it may be directly produced by setting aside a solution containing iodate of soda

a id chloride of sodium. Its composition is represented by the formula $2(NaO,IO_5) + 3NaCe + 18HO$. It crystallizes in colourless tablcs derived from the oblique rhombic prism. The crystals soon become opaque from their decomposition into chloride of sodium and iodate of soda ($NaOIO_5 + 2HO$), the latter salt crystallizing in needles. The crystals give off iodine and oxygen when heated.—*Journal de Pharmacie et de Chimie.*

PREPARATION OF VERMILION.

BY M. RINGAUD.

M. Ringaud has patented in France the following improvements in preparing this pigment :—

1. Washing with nitric acid to take out excess of sulphur and oxides of mercury.
2. Washing with solution of a mixture of sulphate of potash and caustic potash.
3. Digestion in hydrochloric acid.
4. Boiling in solution of caustic potash, which gives it a more or less violet tone.

The advantage of washing with acids is already known, but the treatment with alkalies is new.

The vermilion prepared by M. Ringaud, after being treated by the various solutions in the systematic order given above, is said to be of unprecedented beauty.—*Journal de Chimie Médicale.*

PREPARATION OF OXALIC ETHER.

BY MM. TOUSSAINT AND KALLE.

M. Toussaint has observed that the yield of oxalic ether may be considerably increased by augmenting the proportions of alcohol and sulphuric acid, and distilling rapidly. He recommends the following quantities of each :—

Binoxalate of Potash	250 parts.
Alcohol	400 „
Sulphuric acid	400 „

If a gentle heat be applied, much of the alcohol is resolved into hydride of ethyl ; if, on the contrary, as soon as the alcohol and sulphuric acid have been mixed with the binoxalate in fine powder, sufficient heat be applied to cause the contents of the retort to froth up, the operation may be completed in less than an hour, as shown by the disappearance of the frothing.

M. Kalle prefers another process. He takes—

Oxalic acid, dried at 100° cent....	180 parts.
Bisulphate of potash	100 „

These ingredients are mixed together, introduced into a tubulated retort, and heated to 150° or 180° cent. ; 250 parts of absolute alcohol, and 25 parts of oil of vitriol, are then gradually added. The distillation is then continued; the temperature should not be allowed to fall below 150° Cent.

The distillate is washed with water, and rectified over chloride of calcium.

An abundant precipitate of oxamidc is obtained by adding ammonia to the washings.—*Journal de Pharmacie et de Chimie.*

NEW MATERIAL FOR THICKENING MORDANTS IN DYEING.

BY M. SCHWARTZ.

The author has ascertained that the leaves of the common potato-plant, when roasted, may be advantageously employed for this purpose. The leavcs have met with a ready sale to the dyers of Mulhouse at 35 fr. the 50 kilog.—*Journal de Chimie Médicale.*

MR. ATTFIELD'S ACARI.

We recently noticed the Acari discovered by Mr. Attfield feeding on colocynth, taraxacum, nux vomica, and other nauseous or poisonous vegetable extracts, and

which had induced him to try the experiment of feeding some on strychnine. Mr. W. Symons has drawn our attention to a singular fact, which was stated at the British Association meeting at Cheltenham, when strychnine, on account of the excitement then caused by the trials of Palmer and Dove, was made the subject of much discussion, viz., that some pheasants had been poisoned by feeding on living maggots, bred in the bodies of some vermin poisoned by that substance. Some inquiries into the poison-eating capabilities of insect larvæ might therefore reward experimenters with some curious facts.—*London Review.*

MISCELLANEA.

Suicides by Prussic Acid.—On Wednesday afternoon, February 26th, an inquiry was conducted before Mr. John Humphreys, one of the coroners for Middlesex, at the residence of Dr. Bletchley, of No. 7, Tabernacle Walk, City Road, into the circumstances attending the death of Mr. Frank Taylor, aged twenty-one years, a medical student. Mr. John Taylor, a gentleman living at Paradise-house, Oxford, the father of the deceased, said he had not seen the deceased since Christmas last, when he spent a few days at home. One of his family received a letter from the deceased on Thursday, February 20th. It was written in a very incoherent manner, one portion being in black-lead pencil, and the other in ink. He knew nothing as to the cause of deceased's death. Mrs. Elizabeth Bletchley said, the deceased was a pupil of her husband, that she last saw him alive on Sunday night, about half-past eight o'clock, when he came home, and shortly afterwards went into his room and locked himself in. Mary Abbott, a domestic servant, was examined, and said that she knocked at the door two or three times on Monday morning, February 24th, but could not get an answer. She then called her master. Dr. Bletchley said that upon finding the door fastened he cut away the side of the woodwork, and made a forcible entry into the apartment. He discovered the deceased lying on the bed in a composed state, and the bed-clothes covered over him. He searched the room, and found a bottle in the wash-hand basin, which contained a small portion of prussic acid. The witness then searched the deceased's pockets, and found two letters. One was directed to Mrs. Bletchley, and the other to a young lady who resided in the country. The letters were in the deceased's handwriting, and had been written shortly before his death. That to Mrs. Bletchley was to the effect that he was about to poison himself with six drachms of prussic acid which he had obtained from the shop, as he was unable any longer to bear up against his troubles. The deceased left a number of trinkets, books, and other articles to various persons, and gave his gold watch to the young lady mentioned above, to whom he had addressed a long and affectionate letter, which filled four folios of foolscap paper. Mr. Bletchley said, in answer to the coroner, that the deceased had lately, when he came from the hospital, been in very low spirits, which was attributed to his non-success at his late examination. Mr. Graham Bennett, a medical student, of No. 6, Finsbury Circus, was then called, and said that he knew the deceased intimately. He had heard him express a fear that he would not pass his examination. He believed that the dread of failure had affected his mind. Mr. Taylor, the father, said, in answer to the coroner, that the deceased did not like his profession and had expressed a desire to go to sea. After some further evidence had been heard, the jury returned a verdict of "Temporary Insanity."

An inquest has been held in Sunderland, on the body of Dr. Henry Hodgson Ogle Hay, who was found dead in his surgery. The evidence adduced was to the effect that the deceased had of late been much troubled in his mind, and that while in this state he took a large dose of prussic acid, from the effects of which he died. A verdict of "Temporary insanity" was returned.

An inquest was held at Nottingham, on Thursday, March 6, upon the body of Mr. M. Ford, the proprietor of extensive chemical works at Basford, near Nottingham. It appears that on Wednesday morning he was in the town, and during his stay there a returned bill of exchange was shown to him. Mr. Ford was the drawer of the bill, which purported to have been accepted by Messrs. Hall and Sons, starch manufacturers, New

Lenton. He was informed that the signature of the latter was a forgery, when he replied, "It's all right; give it to me, I will let you have the money for it." The holder of the bill, however, refused to give it up, and he was told that a criminal prosecution would at once be commenced against him. Mr. Ford then returned home. During the morning a warrant was obtained for his apprehension, and two detectives of the borough force proceeded to Basford to take him into custody. They reached his residence about two o'clock in the afternoon, and were then apprised that Mr. Ford was dead. On reaching home it appears that he went into his counting-house and seemed to occupy himself with his books, but in a few moments he was heard to make a strange noise, and died almost instantly in convulsions. A surgeon was promptly in attendance, and every possible effort was made to restore the unfortunate man to consciousness, but in vain. The medical testimony proved that the deceased had died from taking a quantity of prussic acid.

On Tuesday, March 18th, an inquest was held at Wolverhampton on the body of John Norman, M.D., aged twenty-six. On the Sunday previous he had not been in his bed-room more than five minutes, when the servant hearing him vomiting, ran into his room with a glass of water. He was then insensible, and could not drink it. Death took place almost immediately. A measure glass was found by his bed-side, and a bottle that had been half full of hydrocyanic acid. A letter addressed to his father, and to the effect that deceased was "going beyond his income" was found on the table. The inquiry was adjourned.

On Friday, March 21st, Mr. Ratcliffe coroner for the Liberties of the Tower of London, held an inquest on the body of Charles Maxey, aged thirty-seven, a serjeant of the 3rd Regiment of Foot. James Furnish, an orderly in the Tower, deposed that on Wednesday morning last, about half-past ten o'clock, he was sent by one of the officers to the back surgery of the hospital to get some medicine. He found the door locked, and no key in it. He got through the window on the first floor, and, on entering the room, discovered the deceased upon the floor of the surgery, apparently dead. There were four bottles on the table, the necks of which had been knocked off. Dr. Treevan, the assistant medical officer of the 3rd Regiment of Foot, stated that the deceased had the superintendence of the cooking, and issued the diet to the sick in the hospital of the Tower. It was his duty to compound and make up the medicine ordered by the witness. On the morning of Wednesday witness sent to Furnish, the orderly, for some medicine. He came running back and said the deceased was lying dead in the surgery. The bottles on the table had been full of prussic acid, and one remained half filled with the same poison. He had made a *post mortem* examination of the body, and did not find any marks of violence. He found all the organs quite healthy, excepting the stomach, which was congested, and contained about a pint of dark-coloured liquid. He tested it, and found that it was chiefly prussic acid. The deceased must have emptied the three bottles to have swallowed such an enormous quantity. He could account for the act only from the fact of the deceased having been recently refused promotion at Woolwich. The jury returned a verdict to the effect that the deceased died from the effects of prussic acid, taken by his own hands while of unsound mind.

On the 4th of April, an inquest was held at the Morpeth Castle, Wick Lane, Old Ford, Bow, before the deputy coroner for East Middlesex, on the body of John Ford, aged seventy-four, a surgeon, who died from the effects of prussic acid. It appeared from the evidence of his son that on the 29th of March deceased was seized with choking. A lodger in the house first heard deceased making a noise. When they went upstairs he was found lying on his bed insensible. Mr. Cooper, surgeon, was sent for, who pronounced him dead. It appeared that deceased was in pecuniary difficulties. The contents of the stomach were analysed by Mr. Cooper, who found sufficient prussic acid to account for death. The jury returned a verdict of "Temporary insanity."

Arsenical Mucilage in the Treatment of Cancer.—The following is Dr. Marsden's formula for arsenical mucilage, referred to in the 'Lancet' of March 1st:—"Arsenious acid, gum arabic powder, of each one ounce, mixed with five drachms of water. The part affected to be painted over with the mucilage night and morning, never exceeding one superficial inch. As the part becomes deadened, it must be al-

lowed to slough off, aided by the application of a simple warm bread and water poultice. When all the diseased part has been thus got rid of by the repeated application of the mucilage, a carrot poultice should be applied during the night, and a weak black lotion during the day (calomel, one drachm; lime water, one pint), until the part is entirely healed."—*Lancet.*

Poisoning by Atropine.—The following case, as illustrating the mutually counteracting effects of opium and belladonna, is given by William S. Steele, Esq., in the 'Medical Circular,' March 19.

After trying the effect of the hypodermic injection of twenty minims of tincture of belladonna, with little or no effect, on a patient aged thirty years, suffering from sciatica, Mr. Steele observes:—"About ten the next morning I injected into the same place a solution containing one-eighth of a grain of atropine. I left my patient for about ten minutes; on my return he complained of being very faint and ill, and of being unable to see. In a short time he became delirious. The pupils were dilated to the utmost possible extent; the mouth and fauces were extremely dry and red; the pulse was rapid and feeble; there was no appearance of pain; on the contrary, the sensations seemed to be of a pleasing character. On being aroused, he was capable of answering, in monosyllables, questions put to him. Having read of cases of poisoning by belladonna in which opium had been given, I determined to try it; I therefore gave him forty minims of the tincture of opium in brandy and water; this not having any apparent effect, after waiting a quarter of an hour, I repeated the dose. In a little time my patient became rather more conscious, so an hour after the second dose I gave him sixty minims more. Finding him gradually becoming more conscious, I continued the opium in smaller doses until four o'clock in the afternoon, at which time he had taken 240 minims of the tincture. The delirium had then ceased, and he was quite sensible; he told me that a few moments after the atropine was injected he felt very ill, but directly after he became insensible, and had not the slightest recollection of anything that had happened during the day. He had a good night, but was not in the slightest degree narcotized by the opium. I am glad to say the pain was almost removed. The patient was not in the habit of taking opium in any form."

The Rugby Water Supply.—The Rugby Board of Health discover that the plan which it has pursued for four years, and upon which it has spent £4000, for supplying the town with water, has irremediably failed. Mr. Hawkesley, who was called in to advise the Board, gave his decided opinion that the river Avon was the only feasible source from which an adequate supply could be obtained. But, in consequence of the opposition of the neighbouring owners of watermills and other difficulties, Mr. Hawkesley was induced to suggest that the difficulties might be obviated by boring down to the water-bearing strata of the new red sandstone. The boring has reached the water-bearing strata of this formation, but it has also reached a deposit of rock-salt, the existence of which was wholly unsuspected, and the salt dissolving in the water brought up by the bore-hole communicates to it a degree of brackish salinity which renders it totally unfit for food, as well as for all ordinary domestic purposes. From an analysis of samples which have been successively taken, it appears that the salinity has steadily increased, until in the last specimen there were found 1256 grains of saline matter in the gallon of water. Of these 777 grains consisted of chloride of sodium, the remaining constituents being principally sulphate of soda and sulphate of magnesia, with a small proportion of carbonate of lime and traces of bromine, iodine, and lithium. It is thought probable that further boring into the salt bed would increase the saltness of the water to the degree which would make it available as a brine spring for salt-works; or that if the boring were continued to the next subjacent formation—the Permian—abundance of good water would be found. Dr. Odling has reported that the water "would doubtless prove an efficient saline purgative, and the small quantities of bromine, iodine, and lithium would enhance its therapeutic qualities."

Emplastrum Resinæ.—The following modification of ordinary resin-plaster is recommended by M. Desmalines:—White wax, 100 parts; resin-plaster, 500 parts; and calamine powder, 60 parts. The wax and plaster having been melted together, the calamine is stirred in.—*Gazette Méd.*, No. 11.

TO CORRESPONDENTS.

Tasteless Pills.—To the Editor of the 'Pharmaceutical Journal.'

Sir,—I beg to inform you that my process for coating pills was provisionally patented in April, 1861, and was renewed, and that Mr. Davison was wrong when he stated that it was public property. Yours, etc.,

R. C. Furley.

[We have examined the specification of Mr. Furley's process, and find that it was, as Mr. Furley states, renewed October 12th, 1861, but we are informed that it has since been abandoned: the process, therefore, is now open to the public.—Ed. P. J.]

Chlorodyne.—In reply to a correspondent we give Dr. Ogden's formula for *Chlorodyne*, published in the 'Chemist and Druggist,' January 14, 1860:—Take Chloroformyli f℥vj; Ether. Chlor. f℥j; Tinct. Capsici f℥ss; Olei Menth. Pip. gr. ij; Morphiæ Hydrochlor. gr. viij; Acid. Hydrocyanici (Sch.) gr. ×ij; Acid. Perchlorici gr. ××; Tinct. Canab. Indicæ f℥i; Theriacæ f℥j; Misce.

Excelsior (Bilston).—*Aqua Menthæ viridis.*

Oxley (Manchester).—*Subjects of Examination.* See page 536 of our last number.

W. L. B.—The label in question would render the article liable to the Patent Medicine Stamp Duty.

R. A. (Bridlington Quay).—The presence of Methylated Spirit in Sweet Spirit of Nitre can only be detected by the odour, after careful evaporation.

M. P. S. (Guildford).—The amount of insoluble matter in opium varies exceedingly, no two samples scarcely yielding the same amount. The colour of the solution is equally variable, and is therefore no test of the quality of the opium used.

E. H. M. (Plymouth).—(1) *Solution of Valerianate of Ammonia* is made of various strengths; that of Pierlot contains $\frac{1}{25}$th of its weight of the pure salt: for convenience in dispensing a solution is sometimes made containing 25 per cent. of the salt. (2) *Dextrine* is produced by the action of acids on starch. See any work on Chemistry. (3) The defect complained of cannot be remedied. (4) *Liquid Cochineal.* Take Cochineal, salt of tartar, cream of tartar, and alum, of each ℥j, boil in ℥viij of water, and strain. (5) *Prize Herbarium.*—See page 493. (6) "I, and I think many more of your correspondents would be obliged by your inserting the formulæ asked for, instead of being referred to such and such a page, in such a volume, for few have all the old volumes of the 'Pharmaceutical Journal,' or even the means of referring to them." [As the 'Pharmaceutical Journal' is supplied gratuitously to all Members and Associates, it is presumed that it would be kept for reference.—Ed. P. J.]

Inquirer (London).—(1) You would most probably obtain what you desire by applying to Mr. Brocas, Hart Street, Bloomsbury Square. (2) You must become acquainted with the botanical characters of the plants generally.

Lichenes (Sheffield).—The specimens forwarded are too incomplete for positive identification; but No. 1 appears to be *Usnea florida*, and No. 2, *Parmelia sinuosa*, Achar.

U. H. N.—The cost of the process would exceed the value of the product.

T. C. Thompson (Liverpool).—All competitors for the Botanical Prizes and Honorary Certificates, must be Registered Apprentices, Associates, or Students of the Pharmaceutical Society, and their age must not exceed twenty-one years. (See Regulations for the Botanical Prize, in the 'Pharmaceutical Journal' for April of the present year.)

A Student (Leeds).—Bentley's 'Manual of Botany' (Churchill). Price 12*s.* 6*d.*

S. S. S. (Aylesbury).—A solution of nitrate of silver will answer the purpose; or, the "solid marking ink" may be used.

Instructions from Members and Associates respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editors, 17, Bloomsbury Square.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. III.—No. XII.—JUNE 1st, 1862.

PHARMACY AT THE INTERNATIONAL EXHIBITION.

The Exhibition of the products of nature, industry, and art, from all parts of the world, which was officially opened on the day of our last publication, cannot be said to be fully and fairly opened even now that a month has elapsed. The work that remains to be done, however, is reduced to the disposal of the contents of a few packing-cases, the completion of the fitting up of two or three of the great organs, the setting out of products from some of our distant colonies, and the putting of the last finishing touch, in the way of arrangement and decoration, so as to make the different parts harmonize, and the whole to produce the best and most striking effect. Those who have waited for the days of cheap admission will have no cause to regret the delay. The impression produced on entering the building now cannot fail to be lasting, and no one will wish it to be effaced. Those of our readers who have not yet paid their first visit, and perhaps even those who have, will desire to know where the chemical and pharmaceutical products are to be found. We have met with some visitors who, after wandering about for a whole day, have never found their way into the eastern annex, where the British products, in class 2, are displayed. But even should this, which has been termed the *terra incognita*, be discovered, it is only British products that are exhibited here. Foreign products of the same class are to be sought elsewhere.

We will assume that the building is entered under the eastern dome, which is by far the best point at which to enter, as the view from the raised platform here is remarkably fine. In front is the nave, extending from the eastern to the western dome; to the left is the south-eastern transept, and to the right is the north-eastern transept, at the end of which is the entrance to the eastern annex. This annex, then, is an extension of the north-eastern transept, but the approach to it has been made somewhat obscure by the necessity there was to pass under the entrance to the Horticultural Society's Gardens, which has been effected by means of a flight of steps on one side, and a gradual incline on the other side. The first part of this annex is devoted to Class 1, "Mining, Quarrying, Metallurgy, and Mineral Products," and immediately beyond this are the Chemical and Pharmaceutical products of British exhibitors. There are 213 exhibitors in this class, but in the exhibits are included some things, not strictly chemical or pharmaceutical, such as blacking, varnishes, etc. The exhibition of chemical and pharmaceutical substances is, on the whole, a very good one. Carbonate and bicarbonate of soda, prussiates of potash, alum, phosphorus, iodine, chloride of lime, chlorate of potash, the mineral acids, etc., are all well represented; so also are the chemical substances used as pigments and in dyeing, including the new dyes made from coal-tar. General chemical products, such as metallic and other salts, and organic products, most of which are used in medicine, are exhibited by some of our first manufacturers, and these altogether make a very good show. Of strictly pharmaceutical preparations that are not chemical, such as extracts, essential oils, and dried herbs, there are also several exhibitors, who very creditably support the character of English pharmaceutists, in as far as those particular preparations are concerned. The collection of drugs and preparations (chemical and Galenical) which has been formed under the auspices of the Pharmaceutical Society, forms by far the most pro-

minent feature in this part of the Exhibition. There is in this collection nearly every recognised medicine used in this country, and in many instances there are several specimens of the same substance obtained from different sources. As the contributors to this collection comprise, with very few exceptions, all the leading druggists and pharmaceutists of London, as well as some in different parts of the country, the specimens exhibited may be considered fairly to represent the existing state of British pharmacy. The manner in which the contributors have responded to the invitation of the Committee is quite satisfactory, and fully realizes what was contemplated. The unmanufactured drugs have been supplied by Messrs. Horner; Herrings; Baiss Brothers; M'Culloch and Squire; Evans, Lescher, and Evans; Preston and Sons; Morson and Son; Allen and Hanburys; J. Bell and Co.; Butler and M'Culloch, etc. The object has been to show fair average samples of drugs such as the London market supplies; but in many cases the quality of the samples is perhaps a little above the average, and in some instances it is quite unusual. There is a complete collection of chemical substances used in medicine, contributed by Messrs. Howards and Sons; Davy, Mackmurdo, and Co.; Huskisson; May and Barker; Morson and Son; Hulle; Garden; Condy; Foot and Co.; Brewer; Whitlock; etc. Lastly, the pharmaceutical preparations that are not chemical, are contributed by Messrs. Allen and Hanburys; Allen and Co.; Allchin; J. Bell and Co.; Blake, Sandford, and Blake; Barnes; Brewer; Bucklee; Banner, of Liverpool; Constance; Corbyn and Co.; Curtis and Co.; Cracknell and Co.; Darby and Gosden; Davenport; Deane; Dinneford and Co.; Fisher, Son, and Haselden; Gissing; Gould; Greenish; Horncastle; Hooper; Lacy; Lawrence; Long; Mackay, of Edinburgh; Moore, of Manchester; Mauder, Weaver, and Co., of Wolverhampton; Pedler; Waugh; Watts and Co.; Whitlock; etc.

It is very much to be regretted that the specimens exhibited from abroad could not have been placed in the same part of the building as those contributed by British exhibitors, as such an arrangement would have greatly facilitated the comparison of British and foreign productions of the same sort. From a careful examination of the pharmaceutical preparations exhibited in the several foreign departments in which there are any, we have reason to believe that we should have nothing to fear from a comparison of the specimens in our collection with any of these. We believe, too, that the exhibition of this very excellent and complete collection of medicines which has been furnished by the Committee of the Pharmaceutical Society, will tend to raise the character of English pharmaceutists in the estimation of foreigners, and, indeed of all those capable of judging, who avail themselves of the opportunity afforded them for thoroughly examining these substances.

In the French, and also in the Austrian department, there are pharmaceutical preparations deserving attention. There is also an extensive collection of medicines from Turkey, a less complete one from Philadelphia, and collections from China and Japan. These will be examined with interest by many of our members, and a detailed description of all will be entered upon in our next number.

THE BENEVOLENT FUND.

The question of the Benevolent Fund of the Pharmaceutical Society, which formed so prominent a topic of discussion at the general meeting reported in our present number, is really so important that it must be a matter of congratulation to every member of the Society to find it once more engaging the attention of gentlemen anxious and able to dispel the torpor which seems to have crept over the great body of Pharmaceutists respecting it, and it is

earnestly to be hoped that it will not, on this occasion, be "*vox et præterea nihil.*"

When, in 1841, the Chemists and Druggists of England were drawn together to resist what seemed to be an unjust and uncalled-for interference with their rights and privileges, some enlightened and far-seeing individuals took advantage of the accidental union to weave a higher and more permanent bond of concord; they united with a scheme of education which should elevate their body and materially subserve the public welfare, an element of benevolence and possible (though undesired) self-interest. Looking round on the careful provision made in almost every other profession and trade for the misfortunes of age, and the unexpected calamities which so often befall those even apparently most prosperous, they determined to found a means of help for Members and Associates of the Society in time of need; help for him on whom fortune might have frowned; help for the Widow in distress; help for the Orphan.

The establishment of "*A Fund for the Relief of distressed Members and Associates of the Society, and of their Widows and Orphans,*" stands prominent in our Royal Charter of Incorporation as one of the objects of the Society.

Many of the first workers in this cause are no longer with us; men whose names will be honoured, and whose example should be followed, as long as the Pharmaceutical Society exists; and could those men look down on our subscription list, could they see that the whole body of Members and Associates are content to contribute only fifty pounds annually to this fund, we think they would congratulate themselves on having passed away before such apathy came upon us. It was not enough for them that the Society should be able to give an occasional twenty or thirty pounds to a needy man; they contemplated annual pensions if necessary, and framed rules for the distribution of such grants, wisely giving to subscribers generally the right of voting when PERMANENT assistance seemed called for. Wisely, too, they determined that a certain amount of capital should be invested before such grants were commenced; but in framing the bye-laws of the Benevolent Fund in 1848, they little contemplated that in 1862 the interest on the investments would scarcely exceed half the sum they deemed safe for the purpose of carrying them into operation.

It must be borne in mind, that when the annual subscriptions were double the amount of those now paid by Members and Associates, a certain portion (not being required for the ordinary working of the establishment) could be appropriated by the Council to the Benevolent Fund, and we find in some years grants of five hundred pounds voted; but when the subscriptions were reduced, such a thing became impossible.

Some few gentlemen, viewing the question we think not simply in a liberal but also in a wise spirit, at the time of this reduction transferred the guinea or half-guinea thus remitted to the Benevolent Fund. Perhaps this was not to be expected from all; but surely all might have contributed something to so good a cause; say even five shillings annually; had they commenced this at once, our Fund would now rank worthily with those of other Societies.

Up to this time the claims have been small, and happily no applicant eligible and really needing relief has sought it in vain; but we must in the common course of things expect more calls for assistance in future.

This absence of distress, or rather silence of distress, for there are doubtless cases of need never brought forward, is used by some as an excuse for non-subscription. The insufficiency of this plea is too plain to require demonstration.

There is another reason sometimes urged; it is, that the good of the fund is limited by the charter, which requires actual connection with the Society up to the time of application. This objection bears the semblance of benevo-

lence; but humble deeds tell for more than noble aspirations, and it is a positive evil when a man's benevolence is so extensive that, being unable to relieve the wants of a whole city, he will not stoop to succour those of his own household. Were the funds of the Society equal to the work, it might perhaps be a matter for consideration whether or not it would be well to extend the benefit to persons who had been Members or Associates for a certain term, even though they had ceased to be such, under adverse circumstances, prior to their application.

Much as this work may have been neglected, it is not even now too late to retrieve our character; and it was gratifying, after the explanations elicited during the discussion, to hear several gentlemen announce their determination to contribute. We believe, if members generally would peruse the rules (printed below), they would be so satisfied of the amount of good to be accomplished, first by their subscriptions, and secondly by their help in the distribution, that they would cheerfully come forward with both; and, by "a long pull, a strong pull, and a pull all together," lift the Benevolent Fund into a position of security.

GENERAL RULES.

1. This Fund is designed for the benefit of distressed Members or Associates of the Society, or their Widows or Orphans, by annual relief or temporary assistance.

2. Annual relief is limited to Members and Associates who have been four years on the books of the Society, or the Widows of such Members or Associates: all Candidates must have attained the age of sixty years, and the relief is regulated according to the following scale:—£15 per annum from the age of sixty to sixty-eight, £20 per annum from the age of sixty-eight to seventy-three, £25 per annum from the age of seventy-three and upwards.

3. Every Member of the Society who may not be in the receipt of, nor an applicant for relief out of the Benevolent Fund, is entitled to Twenty Votes.

Every Associate who may not be in the receipt of, nor an applicant for the like relief, is entitled to Ten Votes.

Every person who shall at any time have given to the Benevolent Fund the sum of Five Pounds, is entitled for life to Twenty Votes, and the like number of Votes for every similar sum of Five Pounds given in like manner.

Every person who shall at any time within the space of a year before the Election have subscribed the sum of Five Shillings and upwards, is entitled for that year to Ten Votes for every sum of Five Shillings so subscribed by him.

A Legacy of £50 entitles the first-named Executor to a Life Privilege of Twenty Votes at every Election of Pensioners; a Legacy of £100 entitles to the like privilege of Forty Votes; and should a Legacy exceed that amount, Forty Votes more are granted for each additional £100, the privilege commencing at the first Election after the payment of the Bequest.

4. Every person voting at an Annual Election, who may be entitled to vote in either of the several characters, is entitled to vote in each of such characters.

5. Any person may vote by proxy, such proxy being a person entitled to vote.

6. In the event of an equality of votes, the Chairman shall have a casting vote.

7. No person possessing an income of Thirty Pounds per annum, shall be eligible to this Fund.

8. Members and Associates as petitioners for relief from this Fund, shall produce a certificate of baptism, or such other evidence of their age as shall be satisfactory to the Council of the Society—shall state the time and place or places in which they have been engaged in the business of a Chemist and Druggist, whether on their own account or otherwise—how their misfortunes originated, and when—their present means of subsistence, and from what source it arises—the number of those (if any) dependent upon them for support.

Widows shall produce evidence of their age—the certificate of marriage, and the certificate of the burial of the husband, or such evidence as shall satisfy the Council on these points—the period during which the husband was in the trade, and where—the cause of misfortune—the present means of subsistence, and from what source it arises—the number of children (if any) dependent on them for support.

9. In all petitions for assistance from this Fund, it is required that the truth of the statements be certified by at least four Members of the Society, or Housekeepers who are subscribers to the Fund, and two of whom are personally acquainted with the facts of the case.

10. The Council after due investigation, if satisfied that the case is an eligible one, shall decide whether the relief to be afforded shall be temporary or annual; and if the latter, the case shall be put on the list of approved candidates for election in the month of November.

11. As soon as the Council have decided upon the case, the petitioner for annual relief will receive written information from the Secretary; and no cards or canvassing letters are to be sent to the Members or Associates of the Society, or to the Subscribers to the Fund, until the applicant has received official notice of the acceptance of the petition by the Council.

12. Annual relief will be forfeited by misconduct, or may be terminated by the Council, should the improved circumstances of the pensioner at any time disqualify him or her to receive the benefits of this Fund.

13. Candidates stand in rotation on the books of the Society in the order of their admission, and the amount of annual assistance is regulated by the age of the candidate when elected, and is never increased under any circumstanees.

14. Candidates are particularly requested to communicate to the Secretary any changes in their places of residence. Candidates must not be present at the election.

15. No Balloting Paper is issued until the Subscription to the Pharmaceutical Society or to the Benevolent Fund is paid.

16. Temporary assistance will be afforded by the Council, at their discretion, to distressed Members or Associates who have been four years on the books of the Society; or the Widows or Orphans of such Members or Associates.

17. Members, or Associates, or Widows, applying for relief, must furnish a full statement of their case, accompanied by certificates, as required by Rules 8 and 9.

Orphans applying (who are eligible only for temporary assistance) shall state their age, and afford satisfactory evidence of the marriage and burial of their parents, and whether any means of subsistence have been left them, and its amount, with the source from whence it arises, accompanied by a certificate signed as required by Rule 9.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *7th May*, 1862,

Present—Messrs. Bird, Bottle, Bucklee, Deane, Edwards, Hanbury, Haselden, Lescher, Meggeson, Morson, Sandford, Savage, Squire, and Waugh, the following were elected

MEMBERS.

BEDFORD.....Anthony, John Lilly.
MANCHESTER.....Eyre, Joshua J.
NEWCASTLE-ON TYNE.....Watson, James.
YARMOUTH.....Poll, William Sheppard.

MEETING OF COUNCIL.—21*st May*.

Present—Messrs. Bird, Bottle, Brady, Bucklee, Deane, Edwards, Evans, Haselden, Herring, Hills, Lescher, Mackay, Morson, Meggeson, Sandford, Savage, Squire, and Waugh.

CONVERSAZIONE.

The Society's rooms were thrown open on Tuesday evening, the 20th of May, for the usual Annual Conversazione, and a large assemblage of visitors

responded to the invitations which had been issued by the President and Council. Among the guests who thus honoured the Society were several eminent foreign chemists and scientific men, who have been attracted to this country by the Great Exhibition. A number of objects of general and scientific interest were, through the kindness of many friends, provided for the occasion; but the same cause which contributed to the presence of several distinguished visitors also prevented the Council from making so good a display as might otherwise have been obtained, the Exhibition having monopolized many of the objects of interest of the day. Upon the walls and tables of the reception-room were arranged some interesting specimens of native weapons, etc., from Australia, kindly contributed by Mr. A. B. Squire. Several valuable pictures, including a remarkably fine portrait of Her Majesty, and another of Sir James Clark, were kindly furnished by the President and Messrs. Vokins. Some fine busts by Mr. F. Butler were arranged on pedestals, and contributed to the decoration of the rooms. Messrs. Jackson and Graham also furnished some fine bronzes, and Messrs. Phillips some handsome specimens of Majolica ware. One of the prominent objects of attraction was a magnificent crown of crystallized acetate of rosaniline, for which the Council were indebted to Messrs. Simpson, Maule, and Nicholson. This substance, which in solution constitutes the beautiful magenta dye of commerce, has been recently obtained in a remarkable state of purity by Mr. Nicholson, and has formed the subject of an important investigation by Dr. Hofmann, the results of which were briefly described in our last number. From the splendid metallic green aspect which the crystals present when viewed by reflected light, this salt constitutes one of the most beautiful compounds yet produced by the chemist. Around one of the principal rooms was arranged a large collection of ferns and algæ from Australia and Japan, beautifully preserved and mounted by Mr. Jardine, who kindly lent them for the occasion. The Royal Botanic Society also contributed a considerable number of living specimens of medical and economic plants, many of which were in flower, including the *Podophyllum peltatum*. Mr. Ward furnished some interesting botanical specimens, and also one of his closed cases. Two fine salt-water aquaria, from Mr. Lloyd, were also provided. The Testimonial which had been presented to Professor Bentley on the previous evening was displayed in the rooms, and attracted great attention.

In the Laboratories Mr. Ladd excited considerable interest by throwing the electric light upon some soap bubbles, which were blown with a peculiar solution, recently described by M. Plateau, made with pure oleate of soda and glycerine. This solution furnishes bubbles of remarkable size, sometimes extending to seventeen inches in diameter, which may be retained for some length of time, and display very beautiful iridescent colours on their surface. In a darkened room Mr. Ladd also exhibited a number of experiments with some powerful induction coils. There was an unusually good display of fine microscopes, including a number of binoculars, for which the Council were indebted to Messrs. Ross; Smith and Beck, and Powell and Lealand. Dr. Gladstone also kindly contributed a very curious microscope in silver, which was made for the late Duke of Marlborough, and which, by the side of the new binocular, illustrated the extraordinary improvement effected in this instrument within the last few years. Under one of the binoculars Mr. Attfield showed some poison-proof acari living on strychnine, which attracted considerable attention.

The Council were also indebted to Dr. Müller for several ounces of the chloride of the new element rubidium. Mr. Crookes also contributed a specimen of the sulphide of thallium, a new element recently discovered by him in some samples of native sulphur. Some collections of minerals were exhibited by Mr. Wright, Mr. Gregory, and Mr. G. Knight. Dr. Crace Calvert

furnished a specimen of crystallized carbolic acid; Mr. Fewtrell, specimens of the blue compound recently obtained by Dr. Letheby by the electrolysis of sulphate of aniline; Mr. Manthorp, of Yarmouth, some curious Chinese plasters; Mr. Morson, some Chinese drawings, illustrating the downward career of the opium-eater; Mr. Tilden, a specimen of pure crystallized benzol; Dr. Oppenheim, a specimen of peppermint salt, from Japan; Mr. F. Bassford, some specimens illustrating the artificial production of silk; Dr. Edward Smith, the potash-box and spirometer used in his experiments on respiration; Dr. Liharzik, a set of models illustrating the growth of the human body; Mr. Larkin, some models of crystals.

Messrs. Murray and Heath exhibited an experiment described by Mr. Gore, showing the curious vibrations which take place in mercury when that fluid terminates the poles of a battery during the electrolysis of certain solutions. Messrs. Elliott Brothers exhibited a new form of machine illustrating the laws of falling bodies, recently invented by Mr. Bridges; also a new form of ear-trumpet, patented by Mr. J. Marshall, F.R.S. Mr. L. Casella contributed some new thermometers, patented by him, in which the bulb of the ordinary instrument is replaced by a very fine twisted tube. These thermometers are very delicate, and are, we believe, more especially intended for physiological experiments. Mr. Casella also exhibited some water-colour drawings by the late P. Casella.

Messrs. Horne and Thornthwaite sent a new animal-heat thermometer and some other instruments. Messrs. Ball Brothers contributed some fine large ingots of aluminium and aluminium bronze.

The President contributed some Turkish measures of length and capacity, such as are now in use in Constantinople.

The following have also to be acknowledged:—some crystallized and fused nitrate of silver, from Messrs. Johnson and Son; a large displacement apparatus, from Mr. Curtis; some specimens of painted flock for wall decorations, from Messrs. Green and King; some druggists' sundries, from Messrs. Morgan Brothers; some specimens of a new material resembling india-rubber obtained by oxidizing oils, from Mr. F. Walton; a drawing of a patent ice-making machine, from Mr. Siebe; and some specimens of actinic bottles, new glass taps, percolators, etc., from the York Glass Company.

Mr. Williams exhibited some fine enlarged photographs, and Messrs. Murray and Heath also contributed some beautiful photographs and stereoscopic views, etc.

In the Laboratories there was a display of dialysers in operation, some of them contributed by Mr. Griffin, who also there exhibited his different forms of gas furnaces; Messrs. Jackson and Townson also sent some chemical apparatus.

TWENTY-FIRST ANNIVERSARY OF THE PHARMACEUTICAL SOCIETY.

Wednesday, May 21st, 1862.

MR. PETER SQUIRE, PRESIDENT, IN THE CHAIR.

The President opened the Meeting with the following address:—

It is now twelve years since I had the honour to address you at our anniversary meeting, yet the occasion was somewhat similar; we were then on the eve of a great experiment, under the guidance of that master-mind which has passed away from us during my present term of office, and whose untimely loss has spread sorrow throughout the land. The English people had invited their own producers and those of every corner of the earth to meet together under one roof, and to form an illustrated encyclopædia of the in-

dustry of man. You know what anxiety we felt about the success of that grand scheme. You know what hopes were inspired of the commencement of a millennium, of an era of universal peace and commerce. Our fears for the success of the undertaking proved groundless; it was, on the contrary, a great financial triumph. Our dreams of peace and prosperity were however premature. Since that time we have had two great European wars, and even as we are repeating our peaceful enterprise, a great section of the Anglo-Saxon race, divided against itself, is engaged in a fratricidal war on a scale of magnitude and expense unknown in the history of the world. So far from commerce becoming the great bond of union between all peoples, the whole commerce of the world is deranged by this unhappy strife. At the termination of this my second year of office, which expires to-day, a second Great Exhibition has been opened, and no one who has wandered through its treasures can fail to admit that the progress made in the eleven years which have elapsed is immense. Notwithstanding the deranging causes to which I have referred, the rapid strides which the different departments of human industry have taken during this period, appear quite marvellous. If we look at Class 2, which more immediately concerns us, we find that the development of chemical research is not the least noticeable feature of the present Exhibition. We find that whole branches of industry have sprung up of which not the least trace existed in 1851. Among these I may mention the beautiful applications of aluminium, and the gorgeous hues derived from coal-tar. You will also find in this class a splendid collection of remedial agents in use in Great Britain, which has been collected and exhibited by the Pharmaceutical Society. This will no doubt be of great interest to foreign Pharmaceutists.

The Bye-laws which were framed when I last occupied the Presidential Chair, have been found inadequate to our present wants. A new code has been completed, and only waits confirmation by the Secretary of State. Those laws clearly set forth, that nothing but examination can admit our future members. Examination is now required everywhere; the Dispensers to the Army are only admitted after they have obtained our certificate. The Examination system is applied to the whole service of the Government. You will remember, perhaps, that I expressed a hope in 1850, that we should some day have a National Pharmacopœia; it has always been a hobby of mine, so I trust you will excuse my recurring to it again. I am glad that this desirable result has been at last accomplished; the work is in manuscript and will, I trust, shortly appear. I must still continue the parallel between the present occasion and that twelve years ago. I had then the pleasure of announcing to you that the pupils of this Institution had presented a valuable Testimonial to Professor Redwood. I have now to tell you that Professor Bentley has received a similar mark of esteem. I am sure you will all join me, when I say that I heartily concur in the feeling which has called forth this demonstration. These spontaneous exhibitions of approval speak more for our lecturers than any language can, and the Society may rest assured that this department is in good hands. Our Laboratory is our chief difficulty. We hope to see it filled with pupils, who shall not only study chemistry and pharmacy, but acquire, in the course of training, those habits of order, cleanliness, and regular attendance, so essential to their future success in their profession. Our Museum has been lately arranged for the convenience of systematic study, as far as regards the animal and vegetable products, and we have lately been presented with the whole of the Turkish Pharmaceutical Collection from Della Siedda of Constantinople. This collection is to be placed in our Museum at the close of the Exhibition. We hope to receive many valuable chemical contributions about the same time, when our Chemical Museum will be finally arranged. I refrain from speaking of the Bell

Scholarships and the Evening Lectures. These are noticed in our Report, which I will now call upon the Secretary to read.

The SECRETARY then read the

REPORT OF THE COUNCIL.

FINANCIAL STATEMENT—*From 1st January to 31st December*, 1861.

RECEIPTS.	£	s.	d.
Balance in Treasurer's hands	1045	18	4
Life Members' Fund:			
Fees 115 10 0			
Interest 55 6 2			
	170	16	2
Benevolent Fund:			
Subscriptions 50 19 6			
Interest 157 8 10			
	208	8	4
Government Securities:			
Proceeds of Sale of £1643 0 2 Stock 1490 1 0			
Interest 43 3 9			
	1533	4	9
Rent 83 10 0			
Return on Assessed Taxes 17 7 11			
	100	17	11
Fees:			
45 Pharmaceutical Chemists 236 5 0			
57 Assistants 238 7 0			
55 Apprentices 115 10 0			
	590	2	0
Subscriptions:			
351 London Members 368 11 0			
1492 Country Members 1566 12 0			
120 Associates 63 0 0			
51 Apprentices 26 15 6			
	2024	18	6
Arrears of Subscription	53	0	6
Lecture Fees	82	19	0
	£5810	5	6

EXPENDITURE.	£	s.	d.
Benevolent Fund:			
Gratuities	55	0	0
Conversazione 73 7 9			
Pharmaceutical Meetings 5 3 7½			
Inventory of Furniture, Apparatus, etc. 3 3 0			
Repayments of Subscriptions received in excess 7 17 6			
	89	11	10½
House Expenses	63	12	5
Rent, Rates, Taxes, and Insurance	497	9	5
Alterations and Repairs	125	15	4
Fixtures and Fittings	183	8	7
Apparatus	104	17	10
Library	43	1	7
Museum, including New Cases	131	6	8
Furniture	58	7	5
Stationery	12	19	9
Postage	53	19	4
Printing and Engraving	70	2	3
Advertisements	15	0	0
Journals, postage of, etc.	608	12	3½
Carriage	4	12	8
Collector's Commission	25	3	0
Travelling Expenses	116	9	8
Salary to Secretary	250	0	0
Wages	169	14	0
Compensation to Tenant	10	0	0
Expenses of Society in Scotland	64	2	8
Board of Examiners	82	19	0
Professor of Chemistry and Pharmacy, including duties as Curator in his department, and payment of Assistant	300	0	0
Professor of Materia Medica and Botany, including duties as Curator in his department, and payment of Assistant	250	0	0
Subscription to Royal Botanical Gardens	21	0	0
Prize Medals, etc.	9	6	6
Mr. Batterbury, Contractor, for Alterations, etc., £2008 6 1, balance of account; appropriated and apportioned to the following accounts:—			
General Repairs 800 9 0			
Alteration of Lecture Hall (balance) 424 1 2			
Do. Museum do. 104 0 0			
Fixture & Fittings —Laboratory 357 2 7			
Do. Lecture Hall 322 13 4			
	2008	6	1
Architects' charges, balance of their account	221	13	0
Repayment to Secretary, Petty Cash	4	0	8
Balance in Secretary's hands	2	1	11
Balance in Treasurer's hands	157	11	7
	£5810	5	6

We, the undersigned Auditors, have examined the Accounts of the Pharmaceutical Society, and find them correct agreeably with the foregoing state-

ment, and that, as shown by the Books of the Society, there was standing in the names of the Trustees of the Society, at the Bank of England, on the 31st of December, 1861—

On Account of the General Fund, New 3 per Cents. ...		£1000	0 0
Benevolent Fund, 3 per Cent. Consols		5573	16 0
Life Members' Fund, 3 per Cent. Consols		1998	10 4
At that date there was due to the			
Benevolent Fund.....	£113 8 4		
Life Members' Fund	115 10 0		

EDWARD CONSTANCE,
JOHN CARR,
ARTHUR BOWDLER HILL, } *Auditors.*

28*th February*, 1862.

FINANCE.

The financial statement for 1861, now before you, like that of the preceding year, is to a certain extent of an exceptional character; to be properly considered it should be divided into two parts, separating the great outlay for the alteration of the house and laboratory from the ordinary expenses of conducting the business of the Society.

The disbursements of the first class made in 1861 entirely complete the work commenced in 1860, and, although exceeding the original expectation of the Council, that work has certainly been carried out in promotion of the best interests of the Society.

Apart from these extraordinary items, the expenses of the year have been on the usual scale.

LABORATORY.

The Laboratory, which now contains every accommodation for a large class of students, has not been so fully attended as the Council, from the experience of the Sessions previous to 1860, had anticipated; it is hoped this depression is but temporary, and the Council, although disappointed, are not disheartened.

It has been proposed to make the school more extensively useful by admitting young men who, though unable to devote a whole session to study, would yet be glad to avail themselves of the advantages of the laboratory for *special* studies, or the routine work of chemical manipulation, during a shorter period; but in any arrangement of this kind, great care must be taken to avoid even the appearance of giving only superficial knowledge—a course which would at once mislead the student, and derogate from the character which the Pharmaceutical Society has for the last twenty years been endeavouring to establish and strengthen.

BELL SCHOLARSHIPS.

One of the great events of the year has been the establishment of the Jacob Bell Scholarships.

A more fitting memorial could not have been raised to one who was so active in founding, so careful in organizing, and to his last hour so earnest in advancing the Pharmaceutical Society; and the Council feel it a pleasure now to announce that during the past session two students, found worthy after a competitive examination, have been enjoying the benefit of this institution.

In addition to the grant of thirty pounds to each from the fund, these students (through the liberal suggestion of Dr. Redwood) have had free admission to the laboratory.

LECTURES.

The Morning Lectures by the Professors have been well attended, and it will be observed that the admission fees to them now appear as a larger item in the receipts of the Society.

The system of Evening Lectures, which had for some years been discontinued, has been revived, and from the full attendance the Council cannot but think their efforts have been appreciated.

In order to ensure the full benefit of these lectures to the *Society generally*, special arrangements were made with each lecturer for the publication of his lecture in the Journal.

The Evening Meetings have been large, and much interesting matter has been brought before them.

Too much importance can scarcely be attached to these gatherings, for the interchange of ideas; and the record of the experience of the various workers in the same field of scientific investigation, tend greatly to promote success, and to break down those *trade* jealousies which should have no place in a liberal profession.

EXAMINERS.

It is gratifying to observe the progressive increase in the number of men presenting themselves for the Major Examination. Taking the last four years, 1858, 59, 60, and 61, they stand thus:—25, 20, 37, 45.

This proves the growth of the conviction that special education is necessary for the practice of Pharmacy; but this is not the only matter for congratulation which comes before the Board of Examiners. It is not simply the number of candidates, but the extent of their qualifications, which has been advancing. It must be borne in mind that from time to time since the establishment of this Board, greater stringency has been introduced, as the Society may be said to have passed from its infancy, until the examination has reached a thoroughly practical standard; such a standard as satisfies the Medical Board of the War Office and other Government Boards, which, in the appointment of apothecaries or dispensers in the public service, require of all candidates the certificate of the Examiners of the Pharmaceutical Society.

The superior attainments now possessed by young men coming up for examination, is so marked, whether of those who have been pupils in the laboratory, or of those who have only had the ordinary opportunities of business, that a vast advancement in the general state of pharmaceutical education may be inferred therefrom; and this advancement may surely be attributed, directly and indirectly, to the influence of this Society.

Since the last Annual Meeting the Pereira Medal has been handed over to the Society.

Those gentlemen who took an interest in founding this memorial will remember (and those who do not may find recorded in the Pharmaceutical Journals of the period) the proceedings on the subject; they may probably be disappointed that their early aspirations were too sanguine; that the sum subscribed was altogether inadequate to the endowment of an *annual Bronze*, and an *occasional Silver* or *Gold* medal. Enough, however, remains to provide for the Bronze Medal; and acting in strict accordance with the express wish of the founders to connect the name of the great Pereira for ever with the Pharmaceutical Society, the Trustees have placed in the hands of the Council the distribution of a prize for superior attainments in the science of which he was so devoted an investigator.

This introduces a wholesome spirit of emulation amongst the candidates for examination, as the method of disposal suggested by the Board of Examiners, and approved by the Council, gives to those who are up to a certain point in the ordinary ordeal, the privilege of contesting, in a further examination, for the still higher honour of possessing this badge of distinction.

JOURNAL.

At the end of the second year of the new management of the Journal, it is satisfactory to observe that it has fully maintained its ground; its sale *out of the Society*, is one proof of its success.

With the commencement of 1862 new arrangements came into operation, by which a considerable annual saving will be effected. A Committee, appointed in June last, fully investigated the financial department of the publication, received various tenders for printing and publishing, and in the end accepted such as appeared most favourable; still retaining the advantage of Mr. Churchill, as the publisher.

LOCAL SECRETARIES.

By a resolution of Council the appointment of Local Secretaries has been made periodical; and as circumstances differ now from those of the early days of the Society, when no organization existed, it has been thought advisable to vest the recommendation for these appointments in the hands of members residing in the district for which the Secretaries are to act. These arrangements, it is hoped, will induce a more frequent communication.

The period for these elections will be immediately after the election of Council.

BENEVOLENT FUND.

The sum disbursed from the Benevolent Fund in 1861 somewhat exceeded that of 1860, and it is satisfactory to know that the various grants afforded real relief to the recipients.

Let it be borne in mind that in the common course of things larger demands on this fund may be expected. As our Society grows older we may hope for increased vigour and vitality in the Institution; not so in its members.

It would be folly to overlook the fact that old age may put some of us in a condition to need assistance, and it would indeed be painful to the Society to find its resources inadequate on such emergencies.

The Council would draw attention to the rules laid down for the distribution of this fund in 1848, and published in the 'Transactions,' vol. vii., page 510.

Provision is therein made not only for temporary relief at the discretion of the Council, but also for annual pensions to distressed members and associates, or their widows, to be decided by the votes of subscribers.

The capital invested has never justified the grant of this permanent assistance, but it is thought if members generally would again look through the regulations they would see how much more extensively useful this fund might be, and would be inclined to support it more liberally.

BYE-LAWS.

It will be remembered that in the report of last year, the necessity for making certain changes in the Bye-laws was brought forward.

The natural diminution of annual subscriptions (which ceased to be the terms of admission to the Society in 1853) and the inadequacy of the sum

substituted as a life member's fee, gave serious reason for alarm as to the future resources of the Society; its numerical strength might have increased whilst its financial condition went gradually to decay. By the new law, which now only awaits the sanction of the Secretary of State, this downward course will be arrested.

In matters of detail, not involving change of principle, the code of Bye-laws has been altered, and the Council believe much improved.

Other alterations were suggested, but the general expression of opinion on the part of the Society having been against them, they were relinquished.

This has been a work of great labour and anxious consideration.

MUSEUM.

In the Museum additional rooms have been appropriated to contributions from the Animal and Vegetable Kingdoms.

This extra space gives opportunity for a more perfect arrangement and classification of the various objects, and the Curators have been actively employed in displaying them.

It is important that strangers visiting the Pharmaceutical Society (as many doubtless will do this year) should find the Museum an interesting evidence of its labours.

EXHIBITION.

The Pharmaceutical Society having been called on to illustrate the present state of Pharmacy in the International Exhibition, the Council endeavoured, by the formation of a Committee, to enlist the assistance of the members generally, and others, that it might appear worthily on so important an occasion.

The result has been that an extensive collection of drugs and preparations used in medicine has been formed, and placed under the care of an attendant. It has been a principal object in making this collection to obtain specimens from a great number of sources, so that a fair representation may be afforded of the Materia Medica of this country, arranged in one group, and exhibited in such a way, that those who take an interest in this subject may have the means of thoroughly examining the specimens, and comparing them with similar substances exhibited in the Foreign department.

It was resolved that the funds of the Society should not be expended in this matter, and a private subscription has consequently been opened, the amount of which however is not yet sufficient to defray the necessary expenses.

Mr. Boyce then rose to move the adoption of the Report. He said, that in reading the Financial Statement, he thought that there were some items in it which were rather high. With regard to the Journal, he had hoped that the expenses would have been much less, but he was pleased to see from the Report just read, that by the new arrangements the expenses would be much less, and the saving very considerable next year. He thought that the Laboratory was now suited for every purpose, and quite justified the large expenditure that had been made. The Jacob Bell scholarship was a source of much pleasure to him. He was glad to see that the name of so great a man was cherished by the Society, and he quite agreed with the expression in the Report, that "a more fitting memorial could not have been raised to one who was so active in founding, careful in organizing, and to his last hour so earnest in advancing the Pharmaceutical Society." He was glad to see, that the number of gentlemen presenting themselves every year for examination increased; showing that there was a desire for further information generally. He could re-

member some years ago, when gentlemen of their profession would have been glad to have had one quarter of the facilities that were offered to the present generation. He could recollect the time when a student considered himself well up when he knew the Latin names for pump water and common salt. He put that as an instance to show the difference between those days and the present, and of the great advantages that were held out to those who chose to avail themselves of them by the Pharmaceutical Society. He was gratified to see that the attention of the Council had been directed to the Benevolent Fund, which had been in a slumbering state for the last few years. He thought no one could say that it was not a most advantageous fund, and he should be pleased to see it better supported. He had made a calculation, and taking the number of members, he found that the subscriptions to it did not amount to more than 6*d.* per head per annum. He hoped that it would soon amount to 2*s.* 6*d.* per head. He was pleased to see the attention that had been paid to the Museum. After some further observations, he moved that the Report be received and adopted.

Mr. Orridge rose to second the resolution. His friend had alluded to the condition of the Benevolent Fund, and had said he was sorry that it was not supported better. He thought that great vitality would be infused into the subject by publicity. He was sure that if advertisements were inserted in the papers and public journals, a great many more members—country members and others—would hear of it, and give it their support. He had heard two opposite reasons given by gentlemen for not subscribing. One was that there were but few who wanted aid, and the other was that the chemists had so many applications made to them for relief, that they could give no more. These two reasons were both fallacies. There were plenty of chemists who would and could give if they knew what the object and nature of the Fund was. He submitted that the only way to make the Fund flourish was by giving publicity to it, and that was only to be done by advertising in the public journals. He also recommended periodical elections of members to the Benevolent Fund. He begged to second the resolution.

Mr. Deane said, in reference to the Benevolent Fund, that it was commenced by the Council's setting aside a portion of the annual income for that purpose, which they could very well do so long as the subscription was two guineas per annum, and in that way every Member and Associate contributed towards it; but when in accordance with the wishes of the members the subscription was reduced to one guinea, the Council were no longer in a position to do that, and the Fund had to depend for its increase on the voluntary contributions of those who felt interested in its maintenance; and he knew that many of those who at this time contributed towards the fund did so with the guinea saved by the reduction of the annual subscription. In the early days of the Society, the Council thought it would not be prudent to grant *annuities* out of the Fund until the income derived from it amounted to £300 per annum, which it would soon have done had the original subscription of two guineas been maintained for a few years longer. He thought it might now readily be brought up to that condition by a subscription of five shillings, or even two shillings and sixpence from each Member and Associate, the latter of whom were perhaps more interested than the former in its maintenance, for it was more than probable, as time advanced, there would be a greater number of applicants for relief than there had been hitherto. Nearly every case that had been brought before the Council had received temporary relief, and they had the satisfaction of knowing that much and efficient service had been rendered in that way; but he believed he was correct in stating, that of all those recipients not one was a suitable subject for an annuity. It had been supposed that the Council had not the power to dispose of the Fund in a sufficiently liberal manner. That was to some extent a mistake. The charter declares it should be for the relief of *Members*, *Associates*, and their widows. No one could be a member unless he had paid a life subscription in one sum, or kept up his membership by an annual payment according to the bye-laws. Now the difficulty the Council had to contend with was this:—A man had kept up his subscription for four or five years, then ceased to do so for several more, perhaps eight or ten years, failed in business, got into distress, and then applied for relief. He was not a member in consequence of having ceased to contribute to the funds of the Society, and the Council had no power to help him. This was a source of some trouble to the Council, yet the rule was obviously a fair one; and no member of any benefit society or

holder of a policy in an insurance office could have a claim unless his subscriptions were regularly paid. Every one should make a point of keeping up his subscription until trouble forced him to give up business; he would then stand in a very different position in respect to his claim on the Benevolent Fund. The rules for the regulation of the Fund,—two or three of which Mr. Deane read,—although they had been published in the Journal several times, appeared to have been quite forgotten by most of the members; he therefore hoped they would be again published. He would add, that although the income derivable from the present fund is little more than half the sum originally contemplated, there is nothing to prevent the Council from granting annuities so far as the present income will permit. Mr. Orridge's suggestion was therefore worth serious consideration.

Mr. Breton, of Brighton, said:—There was something to be said on the part of the members of the Society. He thought that there was not one in a hundred that had ever been asked for a subscription to the Benevolent Fund. He knew several members who would have subscribed, had they been asked; the Council had said they did not want it. He was only stating what he had heard. He thought that when the subscriptions to the Society were paid, if the Society would call upon the members individually for one shilling or two shillings and sixpence, or what they would choose to give, it would be subscribed. He had no doubt that if better arrangements were entered into, the fund would be very soon raised. He wished to refer to the 'Journal,' and state that it was of no earthly use to the country members, for the articles inserted in it were not suited to the readers. Country members did not want such articles as those on "Chinese Materia Medica;" they would be better pleased to read matters of more import to themselves, such as medical prosecutions, etc. etc.—matters in connection with the general trade. Members expected to find in the Journal matters of trade interest, and were disappointed in not finding them.

Mr. Kent said, with regard to the Benevolent Fund, he wished to throw out a suggestion for the consideration of the Council—that each subscriber of five shillings towards the fund should have one vote; some would then give five shillings, some ten, and so on. He observed, in the financial statement for the past year, that there was £83. 10*s.* received by the Society for rent; and observed that there was a marked difference between the amount received for rent that year and the sum the year before. He wished to ask the Secretary how that difference had occurred. He also wished to know what the amount of £608. 12*s.* 3½*d.** meant for the expenses of the Journal. He observed a sum of £300 paid to one professor, and £250 to another, making altogether £550 for the Society to pay for the instruction of students. Besides those sums the professors received fees from the students, and he did not see why the professors should not be wholly paid by the fees from the students, instead of being paid a salary. He was sorry there was not a larger attendance in the Laboratory, but he was quite sure that so long as the Society charged the amount they did for instruction, so long would the number of students be small; and he thought the fees should be merely nominal, just sufficient for breakage, etc.

Mr. Allchin thought the number who attended the Laboratory, considering the great expenditure that had been incurred, did not look encouraging at all, and he thought the Professor should not be placed in such a position as now, when he must of necessity be sometimes a loser; he recommended that the names of those gentlemen who constituted the Board of Examiners should be placed in the Annual Report.

Mr. Baldock said, being a new member of the Society he felt some diffidence in rising. As allusion had been made to the Benevolent Fund, he could state that although he had been for some time connected with the Society, yet he had no distinct notion as to what the Benevolent Fund was. Allusion had also been made to the Laboratory. Probably those gentlemen who were present would recollect the observations made upon the matter at the last Annual Meeting. Arrangements were proposed for improving the Laboratory which had been carried out by the Professor, but which had not proved satisfactory. He thought that something ought to be done for the benefit of the Professor, and he threw that observa-

* The Secretary explained by giving the items of which this sum was made up.

tion out for the consideration of the Council. He wanted to know what the library was intended for, if it was not for students and members to go and sit and read, and use their time in studying and reading books. That could not now be done, in consequence of the imperfect accommodation afforded; and the books asked for were often found to be out. In reference to the major Associates, he thought it very hard that a major Associate could rise no higher, as by the rules of the Society no person could become a Member unless he was in business for himself. He did not see why that should be, unless it was because a master thought it degrading to be a member of the same society as his assistant. He hoped that was not the reason, and that an alteration would soon be made in the rule, which did not exist in other professions, and he did not see why one society should be an exception to the rule. He thought some little inducement ought to be held out to young men presenting themselves for examination. It was true that there was the Pereira medal; but he was of opinion that the Council should submit subjects for essays, to be published in the Journal, by which the number of students would be increased. With respect to the Journal, he thought that botanical matters were made too prominent in its pages.

Mr. BURDEN said, he should not have trespassed upon the time of the meeting if it were not that this was the only opportunity that the members had of getting the Council together and giving them a volley of envy, hatred, and abuse. He should like to see more of the members attend the evening meetings. He had for a long time been disappointed with the attendances on those occasions. He thought that the meeting-room was not as light and pleasant as it might be. It was solid it was true, but it looked to him a narrow, uncomfortable, gloomy place. He much preferred the old room. In reference to the Benevolent Fund, he observed that £208 odd had been received and only £55 had been expended. They cried out about not having enough subscriptions to be able to entertain the applications made to them. Why didn't they pay all applications until they had no more money left, and then appeal to the members? He was quite sure that if that measure were adopted, and members saw that some good was being done, they would subscribe. He then went on to comment upon the state of the Journal, and said he was sorry to hear what had been stated, because as far as he could judge it was a well-conducted journal and should not be depreciated; in fact, he thought it was one of the first journals of the day. He proceeded to make some observation with respect to the lectures. He observed that a sum of £82. 19*s.* was received for lecture-fees, and wished to know whence they were derived.

The PRESIDENT explained, that these fees were received from the pupils that attended the lectures.

Mr. BURDEN said, he wished to call the attention of the Council to the state of the library, and he thought that it was a very hard thing that young men in business and those who were engaged in the shops of the members of the Society could not obtain books from the library without becoming members. He had on two occasions allowed friends of his to use his name for the purpose of getting books from the library. He did not know whether he was right in so doing, but he thought it was better that the books should be used, rather than allow them to be lying on the shelves covered with dust.

Mr. BRADY thought that those gentlemen who had commented upon the Journal had not exactly told the truth. He thought the class of articles that had been objected to were not without their use, and that some day even country members might wish to know something about Chinese medicines. At the same time he agreed that there ought not to be too much of that sort of matter; but he did not think that there was too much botanical matter, although he should like to see more chemistry. With regard to the Benevolent Fund, he hoped that soon some arrangement might be come to, by which means all deserving applications that came before the Council might be satisfied. There was another matter on which he wished to make one or two observations, and that was with regard to the proposition of the Examiners giving out subjects for competition in the shape of essays. He thought it a matter worthy of notice. He thought perhaps that it would be the means of making the students strive in trying who should produce the best essay upon a given subject.

Mr. Edwards said, in respect to the question that had been raised as to members, the society were not allowed to admit any one but those who had a right to be admitted under their bye-laws. He agreed that the instruction of students might be made cheaper, but he did not go so far as to think it ought to be gratis. The library was intended to contain books of higher character than mere manuals.

Mr. Deane said, as he was one of the Examiners, and Botany was the subject he generally undertook, he thought he was justified in making a few remarks in reply to the statement that Botany was thought more of than Chemistry. It unfortunately happened that many young men thought Botany of little consequence, and that it was a mere science of hard names, and therefore neglected it, thinking if they could pass pretty well in Chemistry and the other subjects, they might easily squeeze through this distasteful one. This was a mistake on their part. The examiners thought no more of Botany than of Chemistry, but with this fact before them they could not justly allow a candidate to pass unless he did it in a creditable manner, Botany being an essential branch of their professional education.

Mr. Tuff begged to call the attention of the meeting to the Patent Medicine Licence. He had on a former occasion addressed a letter to the Council on the subject, which, however, did not appear to have reached them. He thought the amount (£2) paid by those in the Metropolitan District was a great hardship, and he thought the Council should endeavour to get the license reduced.

Mr. Burden could not agree with the last speaker with respect to the Patent Medicine Licence, which, if reduced as proposed, would, he thought, be an injury rather than a benefit to the chemist, as it would be an inducement for the proprietor of every little stationer's shop to keep patent medicines, to the disadvantage of the chemist, if not to the injury of the public.

After some observations from two or three other gentlemen—

The President put the resolution that had been moved and seconded, "That the Report be received, and printed in the Journal," which was carried unanimously; and, a vote of thanks to the President and to the Council having been moved, seconded, and carried unanimously, scrutineers were appointed to examine the votes for the new Members of Council. The meeting adjourned to Friday, the 23rd, at eleven o'clock.

ADJOURNED MEETING,

Friday, 23rd May, 1862.

MR. SQUIRE, PRESIDENT, IN THE CHAIR.

The Scrutineers brought up their Report, as follows:—

We, the Scrutineers appointed at the Twenty-first Annual General Meeting of the Pharmaceutical Society of Great Britain, do hereby certify that we have examined the voting papers committed to us, and report the following results:—

Voting papers received.....	712
Disallowed for informality ...	23
	689

Bottle	585	Edwards, J. B.	510	Mackay.....	637	Smeeton.....	425
Bucklee	583	Evans	526	Meggeson	597	Squire	656
Davenport ...	610	Hills	610	Reynolds	401	Standring	596
Deane	646	Lescher.....	571	Sandford	620	Waugh	605

(Signed) Charles E. Turner, *Chairman*. Benj. M. Tippett.
Samuel Gale. Charles Coles.
John Barnard. John Henry Baldock.
William Chrispin. Joseph Kettle.

The following Members were therefore declared to constitute the Council for the ensuing year :—

COUNCIL.

BIRD, WILLIAM LIONEL, 42, Castle Street, Oxford Street.
BOTTLE, ALEXANDER, 37, Townwall Street, Dover.
BUCKLEE, WILLIAM HENRY, 86, New Bond Street.
DAVENPORT, JOHN T., 33, Great Russell Street.
DEANE, HENRY, Clapham.
EDWARDS, GEORGE, Dartford.
EDWARDS, JOHN BAKER, Royal Institution, Liverpool.
EVANS, HENRY SUGDEN, 56, Hanover Street, Liverpool.
HANBURY, DANIEL BELL, Plough Court, Lombard Street.
HASELDEN, ADOLPHUS F., 18, Conduit Street.
HERRING, THOMAS, 40, Aldersgate Street.
HILLS, THOMAS HYDE, 338, Oxford Street.
LESCHER, JOSEPH SIDNEY, 60, Bartholomew Close.
MACKAY, JOHN, 121, George Street, Edinburgh.
MEGGESON, GEORGE, Wandsworth.
MORSON, THOMAS N. R., 38, Queen Square, Bloomsbury.
SANDFORD, GEORGE WEBB, 47, Piccadilly.
SAVAGE, WILLIAM DAWSON, 65, Edward Street, Brighton.
SQUIRE, PETER, 277, Oxford Street.
STANDRING, THOMAS, 1, Piccadilly, Manchester.
WAUGH, GEORGE, 177, Regent Street.

There being only the requisite number of Candidates proposed for election as Auditors, the Chairman declared the following, who had been nominated and had signified their willingness to accept the office, duly elected :—

AUDITORS.

CARR, JOHN, 171, High Holborn.
CONSTANCE, EDWARD, 37, Leadenhall Street.
HILL, ARTHUR BOWDLER, 11, Little Britain.
MCCULLOCH, WILLIAM, 5, Coleman Street.
PRESTON, JOSEPH, 94, Smithfield Bars.

A vote of thanks having been passed to the Scrutineers and to the Chairman, the meeting separated.

PROVINCIAL TRANSACTIONS.

THE BRIGHTON CHEMISTS' ASSOCIATION.

This Association held their first annual meeting in the large room of the Lying-in Institution, West-street, on Friday, the 9th of May; Thomas A. BREW, Esq., the President, in the chair. Present, Messrs. Breton, Cornish, Gwatkin, Noakes, Savage, Smith, Willmott, and Wood.

The Secretary, Mr. Gwatkin, read the annual report, which expressed great satisfaction at the number of members who had joined the Association, but, at the same time, regretted that so few had availed themselves of the quarterly meetings, or of the library. The subscriptions had been well paid, and the Treasurer had a good balance in hand to carry to the next year.

Besides the inaugural address of the President, there had been papers read by Messrs. Savage and Cornish; the former, on 'Chemists and Druggists, past and present;' the latter, on Eclectic Medicines.

Some discussion arose after the report was read. The non-attendance of several members at the quarterly meetings was attributed to their engagements as volunteers, but who would probably in future attend the meetings of the Association.

The President, Secretary, and the old Committee were re-elected, except in the case of Mr. Schweitzer, whose other duties precluded his attendance, and Mr. Willmott was elected in his stead.

The meeting was made special for the election of a local secretary in connection with the Pharmaceutical Society, in consequence of the resignation of Mr. Thomas Glaisyer, who had held the appointment for many years. Mr. Gwatkin was unanimously elected. After tea and coffee, the proceedings of the evening terminated.

PRESENTATION OF A TESTIMONIAL TO PROFESSOR BENTLEY.

On Monday, May the 19th, a considerable number of the present as well as former students met at the House of the Society, for the purpose of presenting Professor Bentley with a Testimonial, consisting of a handsome salver, claret jug, and cups, in silver. The salver bore the following inscription :— "Presented to Robert Bentley, F.L.S., Professor of Botany, by 157 Students of the Pharmaceutical Society."

The testimonial was accompanied by an illuminated address on vellum to the following effect, and bore 157 names :—

"To Robert Bentley, M.R.C.S., F.L.S.,

"Professor of Botany and Materia Medica to the Pharmaceutical Society of Great Britain.

"The accompanying Testimonial is presented by the following present and former Students of the Pharmaceutical Society, in appreciation of his zeal and ability as a teacher, and as an expression of personal respect and esteem."

Mr. Samuel Gale, an early pupil, acted as chairman on the occasion; and the proceedings were very pleasantly terminated at a supper to which the Professor was invited.

ORIGINAL AND EXTRACTED ARTICLES.

ANTI-GRANULATION.

"Omnes omnia bona dicere."

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

When we hear the praises of an individual sounded by all parties, it is but natural to suppose that there is some little discrepancy in the account, because, in order to meet the views of extremes, there must be a tempering of the bad with the good; and so, when an attempt is made to make a hobby of one particular theory or system,—in plain language, to ride an especial favourite to death,—it renders us doubtful as to the correctness of the course pursued. Thus much as an introduction, and now to the point.

It was with considerable interest, and some pleasure, that I commenced reading the paper which appeared in the May number of this Journal, from

the pen of Dr. Thomas Skinner, upon the granulation of medicines; but, as I proceeded, I found myself quite unable to assent to much that was therein suggested; and did not silence on many occasions appear like acquiescence, it might perhaps be wiser and safer to let the subject pass without comment. But feeling that it comes with a good introduction, and some degree of medical sanction, as one who looks cautiously upon innovations, even to the changing of a name, where health is concerned, I beg to be permitted to offer some observations upon certain portions of the paper in question. With the intention, as therein urged, of rendering the administering of medicines more agreeable, safe, convenient and efficacious, and its application in certain cases satisfactory, I with much pleasure agree—and also with the paper itself, as bearing strictly upon a Pharmaceutical subject, for I felt that it must be acceptable to a very large portion of its readers; but of its inexpediency, incapability, and disadvantages in most cases, I cannot but express my firm conviction. Passing over the statement that the form of powder "is the most efficacious in which a medicinal substance can be administered," which I am inclined to doubt, but of which I may not be considered a competent judge, let me proceed to point out some of my conceived objections to the granulation of medicines, and powders more especially. *Imprimis*, some substances would require a greater quantity than others of moisture, if not of gum, before they could be brought into the proper condition for passing through the sieves, and also the amount of moisture retained after spontaneous drying would vary. In order to illustrate this portion, I took two drachms of powdered rhubarb; it required half a drachm of pharmacopœia mucilage to render this fit for granulating; and after spontaneous drying, it had acquired fifteen grains additional weight, one-eighth more than the original; again, two drachms of Gregory's Powder absorbed four scruples of mucilage, and gained after drying, fifteen grains, as in the previous case, although ten grains more mucilage were used; again, two drachms of powdered jalap took up half a drachm of mucilage, and upon drying had gained only eight grains, about one-sixteenth of the original quantity. Thus it would appear that different powders have different absorbing powers, and also different powers of retaining moisture when absorbed. Therefore it naturally follows that spontaneous evaporation simply in a dry room, would not in all cases produce similar results; more heat would therefore be required, in many instances, to bring the granules, when formed, to that particular condition of dryness so that the calculation could be made that only one-sixteenth addition of gum, as stated by Dr. Skinner, had been made. Every practical man must, I think, see the difficulty of this precise application of heat to bring these granules to a state free from that amount of moisture which might reduce or vary the activity of the substance, under the hands of various manipulators.

But now taking for granted that success in granulating simple powders for ordinary use can with care be easily attained, and that no doubt existed as to variableness of strength, that A.'s granules are the same as those produced by B., how must the following be proceeded with—and this a very frequent prescription?—Take of rhubarb half a drachm, carbonate of soda two scruples, powdered calumba half a drachm, compound cinnamon powder eighteen grains—mix, and divide into six powders. Are the powders in this case to be mixed, granulated, dried, and coated?—a slow process for powders required by a patient travelling by the next train;—or must the various granules be shaken and mixed in a bottle, and then divided with such accuracy as the system may admit of? This would indeed be the commencement of a revolution in Pharmacy, but would be accomplished neither "*citò, tutè, aut jucundè.*" And this affords me the opportunity of observing that however much I may admire the chemistry of our foreign friends, I am not of those

who are fond of pointing at French Pharmaceutists as the standard of perfection; if a love of ptisans, with a multiplicity of almost inert ingredients, and a superabundance of sugar, be considered perfection, then indeed they bear the palm.

That the granulation of powders is at all likely to conduce to non-adulteration, is I feel very far from the really probable result; for whether the powder be coarse or impalpable, very few retail Pharmaceutical Chemists possess the conveniences necessary for grinding or powdering their own drugs, therefore in that respect they would be in much the same position as now; and should they purchase these substances ready granulated they would assuredly incur an extra risk of adulteration, and an adulteration rendered by the process of granulation more difficult of detection, and a decided uncertainty as to the strength of the prepared substance. If, at present, purity in simple products can with the greatest difficulty be obtained, and by those only who take the trouble to examine for themselves and pay largely for pure drugs, how could purity and genuineness be expected where the addition of foreign matter was admitted in the manufacture of a simple powder, and where there would be as a natural consequence much competition in price and in the production of an eye-pleasing article, especially if there is to be no increased charge for granulating medicines? The Pharmaceutist is now, we know too well, but indifferently remunerated either for his labour, time, or information.

Now as to the administration of these granulated powders, it may at first appear a very simple matter to tell an adult to put a teaspoonful of granulated Gregory's Powder into his mouth and wash it down with cold water, in a somewhat similar manner as in the days of mustard-seed swallowing; but small grains or granules are sometimes refractory, and would be very likely to hang about the mouth, and sometimes cause a very unpleasant sensation of being choked. Nevertheless, adults might conquer this; but as children are most generally the recipients of powders, I do not see clearly how the granules would succeed with them. One word with respect to the granulation of pill masses. I own to considerable doubt as to success with pil. galban. co., pil. scillæ co., pil. hydrarg., and many others. Indeed, as the matter would then stand, there would be no pills; and now, think of the inconvenience of such an arrangement; every dose must be weighed separately; and when it is remembered how great is the number of pills swallowed daily, the time occupied in weighing each separately would reach a most undesirable amount. A well-coated or silvered pill, in a general way, meets every objection which may occasionally exist as to the difficulty of swallowing, as they can then be washed down with as much water as necessary or even taken well covered with a little jam.

In regulating the dose of ordinary powders, when measured by a spoon, there is generally some little discrepancy. Is the spoon to be heaped up, or brushed off? With granulated powders, as the granules are large or small, so would there be in the same substance more or less difference in the actual dose. With some things it may be urged that a few grains more or less, in the estimation of some persons, could be of no moment; but to how very few, given as powders, would this apply? Certainly not to calomel, antimony, jalap, scammony, or rhubarb, the substances most commonly employed in the composition of powders. It would be cruel to overdose a child, and it would be equally annoying to find that after all the trouble only half a dose had been taken. In the instances of granular citrate of magnesia or aperient lemonade, and preparations of a similar character, a few grains more or less would cause no trouble; but the introduction of such a principle, even in simples, is fraught with danger, for once set up such a system and it might be carried amongst the most potent remedies. To touch upon some preparations which are not

perhaps the most powerful, but still sufficiently important to require accuracy in taking them, namely the granular effervescing carbonate of iron, the granular effervescing ammonio-citrate of iron, the granular effervescing citrate of quinine or of quinine and iron,—all of which are now being offered to the notice of the profession,—can it be said that an accurate dose of any of these can be given when measured by spoonfuls? Any prescriber trusting to such an uncertain method, must run some risk of disappointment; indeed, how can he be sure that his patient will obtain the real amount of the remedy prescribed? He cannot even be certain that the granules have been prepared, except in very few instances, at the establishment where they are dispensed. The offering of these disguised compounds to the profession must eventually lead to uncertainty, disappointment, and probably danger; for to such an extent is it now carried, that I should scarcely be surprised to hear of a granular effervescing citrate of strychnine, iron, and quinine, or some other dangerous compound. Far be from me the intention of deprecating the introduction of any new and valuable remedy, or any sensible preparation which carries with it the stamp of genuine improvement; but, in all honesty, let anything which may seem to encourage empiricism in place of straightforward prescribing be discarded by us.

Before parting with the subject let me add a word of praise due to the ingenuity and skill necessarily called into action by the process of granulation; and although dissenting from the general or wholesale introduction of it, it may possibly, in a few instances, such as charcoal and ergot of rye (as mentioned by Dr. T. Skinner) be found useful—ergot of rye being generally given under the immediate surveillance of the medical attendant; but it may be worth mentioning that the destruction of the activity of the ergot may be prevented by simply keeping a piece of camphor in the bottle, either with the powder or the entire grain, and the objection to this would be the lesser of the two. I trust I may be excused for trespassing so much, but in everything affecting the condition of Phamacy and the body of Pharmaceutists in this country, I feel some degree of interest, and such, I hope, will be a sufficient apology for having entered so fully upon my subject.

A. F. Haselden.

18, *Conduit Street*, 20*th May*, 1862.

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATIONS,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On the Preparation of Sulphuric Acid free from Arsenic.—When Professor Bloxam some time back described his process for detecting arsenic by electrolysis, he stated that he had been unable to obtain specimens of sulphuric or hydrochloric acid which did not yield slight indications of the presence of arsenic when examined by that test. Although the amount so obtained from the purest samples could not mislead an experienced operator, it became desirable to ascertain how far it was practicable to prepare an acid absolutely pure. Mr. Bloxam has accordingly communicated to the Chemical Society the result of a series of experiments on the preparation of sulphuric acid capable of yielding no indications of arsenic by the electrolytic test.

The method generally recommended for the removal of arsenic from sulphuric acid

was first tried, namely, converting the arsenic into volatile chloride by heating the acid with common salt or hydrochloric acid. The result of the trial, varied in several ways, was an entire failure; the resulting acid still containing arsenic. Continued electrolysis of the acid also failed, for, after a powerful current had acted during five hours, the acid still contained arsenic. Fractional distillation, and distillation with bichromate of potash, were also employed, but without any satisfactory result.

Mr. Bloxam's next experiments were directed to the preparation of pure sulphuric acid from sulphurous acid gas. It was found that when the gas was prepared by heating oil of vitriol with charcoal, copper, or mercury, the resulting acid contained traces of arsenic, notwithstanding that the sulphurous acid was well washed in each case. This result appeared to be due to the high temperature employed in evolving the gas; resort was therefore had to preparing the sulphurous acid at a low temperature by decomposing crystallized sulphite of soda with sulphuric acid. The gas thus produced was conducted into a large glass globe,* and oxidized with nitric oxide, prepared from nitre by the action of sulphate of iron and dilute sulphuric acid at a very moderate heat. The resulting sulphuric acid was found not to yield the least indication of arsenic by the electrolytic test.

By this means, then, Mr. Bloxam has been enabled to prepare several ounces of sulphuric acid absolutely free from arsenic. When the binoxide of nitrogen was prepared with copper and nitric acid, a trace of arsenic was present. The following are the conclusions Mr. Bloxam deduces from his experiments:—

"1. That sulphuric acid cannot be completely purified from arsenic either by hydrochloric acid or chloride of sodium, or by repeated distillation, whether alone or with bichromate or permanganate of potash.

"2. That the minute quantity of arsenic found, even in the purest samples of commercial sulphuric acid, is derived from the native sulphur employed in its manufacture.

"3. That when sulphuric acid is required which shall yield no indication of arsenic to the electrolytic test, the sulphurous acid and nitric oxide employed in its preparation must be evolved at as low a temperature as possible, since the fumes which accompany the gases prepared by the ordinary methods, and are not completely removed by washing, bring over small quantities of arsenic.

"It is very probable that experiments conducted upon a manufacturing scale would lead to an easier process for obtaining the sulphuric acid in a state of absolute purity.

In the course of the discussion which followed the reading of Mr. Bloxam's paper at the Chemical Society, it was stated that when the pure sulphuric acid, prepared as above and absolutely free from arsenic, is distilled with common salt, the resulting hydrochloric acid contains traces of arsenic; thus showing that even chloride of sodium is contaminated with traces of arsenic. By substituting sal-ammoniac for common salt, Mr. Bloxam succeeded in obtaining a specimen of pure hydrochloric acid.

In a former communication, Professor Bloxam stated that arsenic acid does not respond to the electrolytic test. This he now finds is not strictly correct, the result depending upon the presence or absence of hydrochloric acid,† although, even when that acid is not present, arsenic acid, as might be expected, does not yield arseniuretted hydrogen so rapidly as arsenious acid. Three experiments were made with pure arseniate of magnesia and ammonia dissolved in dilute sulphuric acid. A quantity of this solution corresponding to 0·1 grain of arsenious acid gave an immediate deposit of metallic arsenic in the heated reduction tube; one-tenth of that quantity gave a deposit in seven minutes (though not so much as would have

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* It was found advisable, for obvious reasons, to dispense with the use of caoutchouc connectors in the tubes immediately leading to the globe in which the gases were mixed, and to employ a perforated glass plate, instead of a cork, for closing the mouth of the globe.

† Since, in the practical application of the electrolytic test to the detection of arsenic in organic mixtures, hydrochloric acid is always present, the addition of sulphurous or hydrosulphuric acid, as formerly recommended, is still necessary. It was while endeavouring to discover, by electrolysis, the state of oxidation of the arsenic in sulphuric acid, that the reduction of arsenic acid in the absence of hydrochloric acid was noticed.

been furnished by arsenious acid), and a quantity representing 0·001 grain of arsenious acid gave a deposit in twenty-one minutes."

Action of Permanganate of Potash on Iodide of Potassium.—M. Weltzien indicates that iodide of potassium is transformed into iodate by permanganate of potash. Some caustic potash and peroxide of manganese are at the same time formed. The following reaction takes place :—

$$KI+2(KO,Mn_2O_7)+6HO=KO,IO_5+2KO,HO+4MnO_2+4HO.$$

The author has verified this equation by estimating the binoxide of manganese and also the caustic potash formed. The formation of caustic potash in this case appears remarkable.

GENERAL COUNCIL OF MEDICAL EDUCATION AND REGISTRATION.

Report of the Pharmacopœia Committee of the General Medical Council.

The Pharmacopœia Committee appointed by the General Medical Council, beg to report to the Council that the manuscript of the 'British Pharmacopœia' is now completed, and most of it ready for press. Until lately the Committee confidently expected to have on this occasion laid a copy of the whole Pharmacopœia in proof on the Council table. But difficulties of a legal nature, from which the Council alone can relieve them, arose about two months ago, and have prevented them in the meantime from continuing their labours.

The Pharmacopœia Committee was appointed by the Council, in the first session of the Council, towards the end of November, 1858. In conformity with the plan of their proceedings approved by the Council, they associated with themselves members from the three Colleges of Physicians and the Pharmaceutical Society of Great Britain. Sub-committees having been then established at each of the three capitals, they commenced their duties in February, 1859.

It was, in the first instance, resolved that the 'Pharmacopœia' should consist of two parts and an Appendix: the First Part to consist of the Materia Medica List; the Second Part, of the Preparations and Compounds; and the Appendix, of such articles as are not themselves used in medical practice, but which are employed for the chemical processes and tests of the Pharmacopœia.

I. The Materia Medica List contains every substance, whether obtainable in ordinary trade, or prepared by chemical processes in the Second Part, which the Committee have found, on careful inquiry, to be so far approved in practice as to be entitled to a place in a national Pharmacopœia. Not a few remedies, contained in the Pharmacopœias of the three Colleges of Physicians, have consequently been removed, and many new ones have been adopted. Under each article of the Materia Medica List the Committee have given—1. A Latin pharmaceutic name, by which it will be prescribed, an English synonym for use in describing the processes in Part Second, and its chemical symbol, if it be a substance of definite constitution. 2. Its definition, together with its botanical reference, if it be a plant, or obtained from a plant, and also a reference to a correct figure of the plant; and in all cases, when possible, a statement of the quarter whence the article is derived. 3. The characters by which it may be distinguished from all other articles in the establishment of the druggist. 4. The tests by which it may be known to be free of known impurities or adulterations. 5. The officinal preparations of which it is an active ingredient.

II. The Second Part, or the Preparations and Compounds, comprises processes for all forms for the administration of medicines, for the extempore prescriptions of practitioners, or for obtaining articles in the Materia Medica List by chemical operations.

The Committee took into consideration the question, whether the transference of the manufacture of many chemicals from the hands of the druggist into those of the manufacturing chemist, might not render it practicable to withdraw a great part of the chemical processes from the Pharmacopœia. But on mature examination it was resolved that they should be retained.

The Appendix needs no explanation.

The Pharmacopœia, thus organized, contains 322 articles of the Materia Medica List, 380 processes, Galenical and chemical, and 49 substances belonging to the Appendix.

In order to settle what articles and processes should be introduced, as well as various other general or preliminary matters, it was soon found necessary to hold a conference of Sub-committees, consisting of three delegates from each.

The conference met in London in May, 1859, and having settled, as far as could be done at the outset, the articles and processes to be admitted, they divided each part into three equal portions, and assigned the charge of one portion of each part to the three Sub-committees.

The portions undertaken by each Sub-committee, as they were brought to maturity, were submitted to both the other Sub-committees, and after this revision were corrected, where necessary, by that which originally undertook them.

It was found indispensable, however, to hold another conference of Sub-committees last year, in order to adjust many points which could not be settled by correspondence.

This meeting was held in Edinburgh in September last. One important result of the conference on that occasion was, that the whole chemical tests in the Materia Medica List, and the chemical processes in the Second Part, were sub-committed to two of the members, who twice met in Dublin in October and December last, to make the necessary experimental investigations.

The meetings of all kinds which have thus been held for the business of the Pharmacopœia have been the following:—The London Sub-committee has met 149 times; that of Edinburgh, 105 times; that of Dublin, 131 times. The meetings of the two conferences were 10 in number, and the Chemical Sub-committee in Dublin met 18 times.

The Committee are able to state that the whole chemical and Galenical processes of the Pharmacopœia, with the exception of some old-established ones which admit neither of doubt nor improvement, have been subjected to experiment, some of them by more than one Sub-committee.

Important differences between the existing Pharmacopœias of the three Colleges of Physicians rendered it imperative on the Committee to settle several difficult questions, in order to effect a uniform system for the three divisions of the kingdom.

The first was the system of weights and measures. In all the existing Pharmacopœias the apothecaries' measures have been adopted or deduced from the "imperial standard" of ordinary trade in this country; and in the last edition of the Dublin Pharmacopœia in 1850, a similar change was effected in the apothecaries' weights. The Committee resolved to carry through the change begun in the Dublin Pharmacopœia by assimilating to one another in value the smaller weights and smaller measures. Adopting the imperial pound and ounce, they have divided the ounce weight of 437·5 grains, as all the Pharmacopœias had previously divided the corresponding ounce measure, into the convenient subdivisions of pharmacy; so that the drachm is the 8th part, and the grain the 480th part of the ounce.

The weights and measures thus correspond with one another throughout all denominations under a pound. It will be seen that in this system the drachm and grain are about one-eleventh less than they were; and that the drachm is nearly double, and the grain about an eleventh less, than the drachm and the grain of the imperial standard. The Committee, however, satisfied themselves that no material inconvenience could arise from the latter circumstance, because the imperial drachm and grain are little used in any trade; and as to the alteration of their value in pharmacy, the inconvenience will be little, and only temporary, because a proportionate change has been made in every process of the Pharmacopœia in which it appeared to be important; nor will any inconvenience arise to the physician or surgeon in their prescriptions, as the difference of an eleventh of a dose is a matter of no moment in regard to any remedy.

The Committee did not adopt this system without taking into account the strong recommendations they received, both in and out of the medical profession, to show an example to the country at large, by adopting a decimal system of weights and measures. The Committee were strongly impressed with the great advantages of such a

system, both in pharmacy and physic; but they were not prepared to say what decimal system should be adopted; and, on the whole, they were of opinion that the Legislature, and not the General Council, should take the lead in this matter.

Another important difference between the existing Pharmacopœias occurs in the nomenclature of the articles of the Materia Medica. As numerous changes were thus inevitable, the Committee have not hesitated to add others, whenever they could, by doing so, either consult the convenience of the pharmaceutic chemist and medical practioner, or put an end to a positively false description.

A third and more serious difference exists amongst the Pharmacopœias of the Colleges, in the strength of preparations bearing the same or similar names. In this branch, too, of their duty, as amalgamation involved numerous changes in one division or another of the country, the Committee did not hesitate to make further changes, when they could thus secure the ultimate convenience of all members of the medical profession, as well as the safety of the public. The trouble to which practitioners will consequently be put for a time, will be partly compensated by greater simplicity and convenience for the future. It occurred to the Committee that all risk to the public would be avoided, and extreme facility to the practitioner attained, by so framing the formulæ for the preparations and compounds, that all articles under one Galenical form should admit of being fitly prescribed in the same dose. Difficulties of detail have prevented this convenient system from being carried out to the full extent; but it has been attended to as far as possible, and increased facility in prescription will be found to have been thus attained.

The Committee must here add, that it will be incumbent either on themselves or on the General Medical Council, to publish a warning to all pharmaceutic chemists and druggists, that, on the publication of the Pharmacopœia, it will be impossible for them to discharge their duties to the public safety unless they destroy or alter all pharmaceutic preparations they may have in store, which have been made according to present formulæ, and the strength of which is altered in the new Pharmacopœia. And a further caution must be given to all medical practitioners, that it will be hazardous for them to exercise their profession without making themselves acquainted with all changes made in the strength of officinal preparations, which changes will be carefully noticed under each article.

If the Council take into account the great extent of inquiry which the Committee have had to undertake, the necessity of consulting the opinions of three separate Sub-committees, far distant from one another, and the prior demands of a professional nature on the time and attention of all their members, no surprise can be felt that a period of three years and a half has been required to complete the work entrusted to them.

The performance of numberless experiments, the expense of Sub-committee meetings, of two conferences of the united Sub-committees, of extensive conjunct investigations in Dublin, the remuneration of secretaries, and sundry other less important charges, have involved heavy outlays and obligations, which will be much increased presently by the charges for printing and publishing the Pharmacopœia. After attentively considering in what manner the probable cost may be defrayed at least charge to the members of the medical profession, the Committee determined that the property of the work should be retained in the possession of the Medical Council.

Here, however, they have encountered a difficulty which has occasioned unforeseen delay. A doubt arose both as to the Pharmacopœia Committee having the legal right to make contracts with printers and others in the name of the Council, and as to any proceeding on the part of the Committee being sufficient to secure the copyright of the work in the Council.

As instructed by the legal adviser of the Council, the Committee are inclined to think that the Pharmacopœia ought to be laid before the Council at a general meeting, and formally sanctioned by them; and contracts must be entered into either by the Council itself, or by parties to be duly authorized to act in the Council's name.

Other legal questions have also arisen as to the copyright of the 'Pharmacopœia,' and the power of the Council to prohibit invasion of it either wholly or partially.

On all these doubtful points it was found necessary to take legal advice. This has been done with the sanction of the President of the Medical Council, and the Committee hope to place the result before the Council at one of its early meetings.

Another question has also arisen, which involves essentially the nationality of the Pharmacopœia. The Medical Act does not contain any statutory injunction, that, after the publication of the Pharmacopœia, the Pharmacopœias of the Colleges of Physicians shall cease to have effect, and that pharmacy shall be practised according to the formulæ of the 'British Pharmacopœia.'

Now the 'London Pharmacopœia' is enjoined as the standard throughout England by an order of Her Majesty's Privy Council; the 'Dublin Pharmacopœia' is, by statute, imperative as the standard in Ireland; and in Scotland the 'Edinburgh Pharmacopœia' is, by use and wont, as exclusively the standard, although it was never made so by statute or charter.

The Council will therefore perceive that there will be nothing to hinder any of the Colleges from republishing its Pharmacopœia, and nothing to prevent pharmaceutic chemists, apothecaries, and others, from using either that or the latest edition of the same, except public spirit and private discretion. It will, therefore, be for the Council to determine whether the 'British Pharmacopœia' should issue as a discretionary guide, or should be fixed as the national standard by the Legislature. And should the Council resolve to adopt the latter alternative, which seems to be the more advisable course, the Committee have to add that no time should be lost in obtaining a short Act for the purpose during the present session of Parliament.

R. Christison, Chairman.

ON THE INTRODUCTION OF THE CINCHONA PLANT INTO INDIA.

BY CLEMENTS R. MARKHAM, ESQ. F.R.G.S.

The present attempt to introduce the species of cinchona-trees yielding quinine and other valuable alkaloids into India, cannot fail to have excited attention not only in the medical profession, but also in all who take an interest in the welfare of our Indian Empire. In the present paper, therefore, I propose to give some account of the nature of those forests in South America of which the cinchona trees are natives, and of the conclusions I have formed after examining some of the hill districts of the Indian peninsula, as to the localities which are likely to be most suitable for the culture of these valuable plants in this country. In the first place, however, it will be well to give a few details respecting the causes which have made this measure so important, to pass in review the attempts which have formerly been made to introduce the cinchona and to state the measures which I took when the conduct of this important experiment was entrusted to me, and the present prospects of its final success.

C. condaminea (Crown-bark).—It is unnecessary to give any account of the well-known story of the cure of the Vice-Queen of Peru in 1639, and of the first arrival of Peruvian or Jesuits' bark in Europe; but from that time the demand for bark, though slowly and with many fluctuations at first, has steadily increased. For a century the plant from which the bark was procured remained undescribed; and from 1638 to 1776 no other bark was met with in commerce, besides that which cured the Countess of Chinchon, which was first described by M. La Condamine, which was the only one known to Linnæus and named by him *C. officinalis*,* and which is now more appropriately known to botanists as *C. condaminea* (vars. *Uritusinga* and *Chahuarguera*), a name given by Humboldt and Bonpland. This species is found in the forests of Loxa, in the Republic of Ecuador.

C. lancifolia (Carthagena bark).—In 1772 that great Spanish botanist Don José Celestino Mutis, discovered a cinchona in the forests near Bogotá growing at a great elevation, and within the region of frosts, now known as *C. condaminea* (var. δ *lan-*

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* In 1742 Linnæus first established the genus Cinchona.

cifolia), and from 1776 its bark began to be exported from the port of Carthagena to Cadiz,—3,000,000 lbs. being shipped from 1802 to 1807.

C. nitida, *C. micrantha* (Grey barks).—The next barks which came into the market were those known as grey barks, which, though not used in the manufacture of quinine, command a good price, and yield the valuable alkaloid called cinchonine. They were first brought into notice by the Spanish botanists Ruiz and Pavon, who described the trees from which the grey bark is taken, naming them *C. nitida* and *C. micrantha*;* and passed some time in the Peruvian forests of Huanuco, where they grow. The researches of these botanists in South America extended over a period from 1778 to 1788.

C. calisaya (Yellow bark).—The cinchona-tree yielding yellow bark, which has long been considered the most valuable of all, was discovered in the forests of La Paz and Cochabamba, in about 1785, by a Spanish naval officer named Rubin de Celis, in company with the German botanist Taddæus Haenke. In 1789 this bark first began to be imported into Cadiz; and in 1820 the tree from which it came, the *C. calisaya*,† was generally known as the best species of cinchona.

C. succirubra (Red bark).—Finally the species yielding red bark, first described by Pavon as *C. succirubra*, but as yet little known to botanists, is now beginning to rival the *C. calisaya* in value. It is found in the forests, at the foot of the great mountain of Chimborazo, in Ecuador.‡

When I was entrusted by the Secretary of State for India with the duty of conducting the present experiment, I determined to take steps for procuring and introducing into this country all the above species, namely:—

C. condaminea (Crown bark) from Ecuador.
C. succirubra (Red bark) „ „
C. lancifolia (Carthagena bark) from New Granada.
C. nitida, *C. micrantha* } (Grey barks) from Northern Peru.
C. calisaya (Yellow bark) from Southern Peru.

The greater the number of valuable species introduced, the greater the chance of success, the more complete the experiment, and the more numerous the chances of finding suitable localities for their cultivation in India.

Rapid destruction of Cinchona-trees.—Improvidence has always been the chief characteristic of the Spanish colonial system. For many years no attempt whatever was made to develop the resources of the magnificent countries in South America which the Spaniards had conquered. The whole energy of their Government in Peru was directed to procuring the precious metals, to the entire neglect of all real sources of wealth; and so reckless was the oppressive cruelty with which they forced the Indians to work in their mines, that, in three centuries, they reduced the native population from certainly over twenty millions in 1560, to barely one million and a half in 1860. The same reckless folly which led them into this course of ruinous cruelty, induced them also to waste and destroy the cinchona forests, and to mix and adulterate the barks, for the sake of immediate gain.

Destruction of C. condaminea.—The improvident felling of cinchona-trees, which is now causing grave apprehension that the supply of quinine may soon fail, was noticed upwards of 120 years ago; so that a warning voice was raised in time, had the Government or people of South America been capable of forethought or prudence. As long

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* The *C. micrantha* was, in fact, first discovered, described, and named by Tafalla, the pupil of Ruiz and Pavon, in 1797.

† The derivation of the word *Calisaya* has been variously given. Weddell says it is from the Quichua words *colli* (rouge), *saya* (forme). Poeppig derives it from *colla* (a remedy) and *salla* (rocky ground). Von Tschudi says it comes from *colli sara* (brown maize)!! My own opinion is, that it is derived from the two Quichua words *coali* (strong) and *sayay*, imperative of the verb *sayani* (to prepare).

‡ *Quina* predominates in yellow barks, exists in red barks, but there is hardly any in grey barks.

Cinchonine predominates in grey barks.

Quinidia is found in Carthagena barks.

ago as 1735, Don Antonio de Ulloa, a naval officer who was engaged in collecting information in South America for the Home Government, wrote that "the Indians who collected this valuable bark near Loxa do not take the necessary trouble to separate it from other species, though the botanist, M. de Jussieu, explained to them that this negligence caused the fall in the price of bark. When they collect the bark, they first fell the tree, and then peel off the bark; and as they do not take the trouble to plant other trees in the place of those which have been felled, there can be no doubt that, in time, these forests will be stripped of them; because, though they are numerous and wide-spread, they have an end."* He goes on to recommend that an order should be issued, that a young plant is to be planted whenever a tree is felled, on pain of a fine. Nothing of the kind, however, was done by the authorities. These remarks refer to the species yielding Crown Bark (*C. condaminea*). The destruction of the *C. calisaya* did not commence until some fifty years afterwards, but it has gone on with perhaps greater rapidity: while at the same time the trees have been the subject of much meddling legislation on the part of the South American Republic of Bolivia, within which territory chiefly they have the misfortune to grow.

Legislation respecting C. calisaya.—In 1830, the price of Calisaya bark fell so low, that the Bolivian Government deemed it necessary to regulate the trade of so valuable a product. It was then determined to grant the exclusive right of exportation to a National Company. Meanwhile the cutting of the trees caused rapid destruction, and at last it was prohibited for five years; but the decree was abrogated long before the end of that time, and a duty of twelve to thirty dollars the cwt. was placed on exported bark. In 1844 the Bolivian Congress decreed the formation of a National Bank or Company to export all bark, on payment of a fixed duty. This monopoly was, in 1845, granted to one Jorge Pinto for five years, who was to pay $119,000; but the measure was very unpopular, and was put a stop to in 1849, when free commerce in bark was again established, the duty levied being $20 the cwt. In 1850 a second monopoly was granted to the brothers Aramayo, who engaged to pay $142,000 a year, for the exclusive privilege of exporting bark; and in 1851 banks of bark were formed both at Cochabamba and at La Paz; but in 1858 free trade was again established, with an *ad valorem* duty of twenty-five per cent.; and a second decree, reducing the duty, appeared in November 1859.†

Bolivian Bank of Bark.—This constant vexatious legislation has arisen, of course, from the restless anxiety of the Government to make as much as possible out of this the most valuable product of the country. The bank, during its existence from 1851 to 1858, paid $60 per cwt. to the bark collectors for the bark; gave $25 per cwt. as a duty to government, $12 per mule load of 300lbs. for freight to the coast, and sold it at the port for about $150 per cwt. The bank, for some years, received as much as 1,400,000lbs. of bark a year.

Destruction of C. calisaya.—Yet with all this amount of interference in the trade, no attempt whatever has been made to preserve the trees, and the words of Dr. Weddell on this subject are remarkable. He says, "Whatever may be said, the forests of Bolivia, rich as they are, cannot resist much longer continual attacks of the kind to which they have recently been subjected. He who, in Europe, sees the arrival of enormous and ever-increasing quantities of bark, may well believe that this will continue; but he who seeks to know how things really are in the native region of the cinchonas, will find himself obliged to think far otherwise. One fact will suffice to show the constant and progressive diminution of the cinchona-trees. Where formerly one met with them everywhere in the vicinity of villages, now to find a tree of a few decimètres in diameter, it is necesary to make a journey of several days' duration, into the bosom of the forests."‡

Personal observation.—Dr. Weddell speaks of Bolivia, and I am able to bear testimony to the truth of his statements, so far as the adjacent forests of Peru are con-

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* Noticias Secretas, p. 572. La Condamine, in 1737, also says that, owing to the wasteful cutting of the trees, those of large size had become scarce, even in his time: and Humboldt states, that not less than 25,000 trees were destroyed in one year.

† Decree of President Linares, dated November 17th, 1859.

‡ Weddell, p. 244.

cerned. During my frequent journeys through various parts of the forests of Caravaya, though young plants and root-shoots of the Calisaya abounded, I never once met with an old tree. They had all been felled. Mr. Spruce too tells me that, in some of the cinchona forests of Ecuador, there does not remain a single tree large enough to produce seeds.*

Importance of introducing the Cinchona plant.—Considering these facts, and the immense value of the quinine which the bark of the cinchona yields, it will at once be seen that the introduction of the plant into countries where attention would be paid to preserving and propagating it, as well as to collecting its bark, must be a matter of very great importance to all civilized countries, and especially to India. Accordingly, the project of obtaining plants and seeds of the cinchona has, from time to time, engaged the attention of more than one European Government.

Condamine's first attempt to transplant the Cinchona.—The first attempt to transplant live plants of the *Cinchona* was made by M. La Condamine in 1737. He says, "I selected some young cinchona plants at Yangana, which I intended for the *Jardin Royal des Plantes*, flattering myself that I should be able to take them at least as far as Cayenne, and there leave them in depôt, to be transported to France. But the same wave which washed over my boat at the mouth of the Amazon damaged the poop, and carried off a box in which I had preserved them for more than eight months. Thus I lost them, after all the trouble I had taken during a voyage of upwards of 1200 leagues."†

Dr. Ainslie's Suggestion.—The first idea of introducing Cinchona plants into India was probably suggested by Dr. Ainslie, who, half a century ago, remarked that it is a matter of regret that "it has never been attempted to rear those articles of the Materia Medica in India, for which the world is now solely indebted to America."‡

Dr. Royle's Suggestion.—The late Dr. Royle, however, was the first person to recommend the introduction of the Cinchona into India, in his work on Himalayan Botany in 1839.§

Labours of modern Botanists.—Twenty years was to pass away before any attempt to carry out this suggestion was to be made, and, in the meanwhile, the labours of botanists were to add materially to our knowledge. Mr. Poeppig in 1832–34 examined the forests of Huanuco, and supplied us with much valuable information respecting the habitat of the species yielding grey bark.‖ Berthold Seemann visited and reported upon the forests where the *C. condaminea* grows near Loxa.¶ Dr. Karsten gave us the results of his important botanical labours in New Granada;** and, above all, Dr. Weddell, the highest modern authority on the subject, published his invaluable monograph on *Cinchonas*.††

Dr. Weddell first entered Bolivia in August 1845, as botanist to Count Castelnau's exploring expedition, sent out by Louis Philippe. In 1846 and 1847 he examined the cinchona forests of Bolivia, and of Caravaya and Santa Anna in Peru; being the first to describe the *C. calisaya*, and several other new species and varieties discovered by himself;‡‡ and he visited the cinchona forests a second time, a few years later.

Dr. Weddell's seeds.—Dr. Weddell transmitted a great number of seeds of the *C. calisaya* to Paris; some of them came up in the Jardin des Plantes, and presents of the young plants were made to the Horticultural Society in England and to the Dutch botanical gardens.

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* As an exception to this improvidence, it ought to be mentioned, that in the forests about the foot of Mount Chimborazo, those who cut down bark trees are said to be in the habit of breaking off young branches and sticking them in the ground, where most of them take root.

† Voyage de la Condamine, p. 31.

‡ Materia Medica, p. 66, *note*.

§ Some time previously M. Fée recommended the introduction of Cinchona into the French Colonies (Cours d'Hist. Nat. Pharm. p. 259.)

‖ Poeppig, Reise, 2 vols.

¶ Voyage of the "Herald," 2 vols.

** Die Medicinischen Chinarinden Neu-Granadas.

†† Histoire Naturelle de Quinquinas. Paris, 1849.

‡‡ Voyage dans le Nord de Bolivie.

Attempts of Dr. Royle.—At about this time, the subject of introducing the Cinchona plant into India was again brought to notice in a letter from the Calcutta Government to the Home authorities, dated March 27th, 1852; upon which Dr. Royle drew up a report, which led to a request being made to the Foreign Office that the Cinchona plants and seeds might be procured through the instrumentality of H.M.'s Consuls in South America. As was to be expected, this measure led to no useful result. Mr. Cope, the Venerable Consul-General of Ecuador, was the only one who transmitted any plants, and they all died on their arrival in England, in December 1853. Some seeds of the *C. calisaya*, procured through Mr. Pentland, and six plants contributed by the Kew and Edinburgh gardens,* however, were taken to Calcutta by Mr. Fortune; but the seeds never germinated, and the plants all died in their removal to Darjeeling. In spite of this failure, Dr. Royle, who took the deepest interest in the subject, drew up another report in May 1853, and in March 1856 he proposed that Dr. Jamieson of Quito should be commissioned to collect plants of *Cinchonæ*, common in Ecuador. This was the last step taken, previous to my appointment.

Attempts of the Dutch.—The Dutch Government had also made attempts to procure plants and seeds for introduction into the island of Java, through their Consuls in South America, which failed; but in 1853, M. Hasskarl, formerly in charge of the botanical gardens in Java, was sent from Holland, to collect cinchona plants and seeds in Peru. During the year 1853 he collected some seeds in the forests of Tarma, of species of *Cinchonæ* which are of no value;† and in 1854 he obtained 400 plants which had been collected for him by a native agent, and which he conveyed across the Pacific to Java, reaching Batavia in December 1854. Several seeds of the *C. lancifolia* were presented to the Dutch authorities by Dr. Karsten, and a plant was also procured, which had been raised from seeds sent to Paris by Dr. Weddell. Only two of the plants of M. Hasskarl's collection survived the voyage across the Pacific.

Success of the Dutch.—Thus the experiment of introducing cinchona plants into Java was commenced. The only valuable species they have obtained are the *C. calisaya* and *C. lancifolia*, as the *C. succirubra* is, I have good reason to believe, placed by mistake in the list lately procured by Dr. Macpherson; and it is to be remembered that none of the gentlemen who have had charge of the Java plantations are personally acquainted with the forests where these species of *Cinchonæ* grow.

Sites selected by the Dutch in Java for Cinchona plantations.—In 1854, M. Teysmann prepared ground for a cinchona plantation at Tjipannas, at a height of 4700 feet above the sea, on the slope of the Gede mountains; and, when M. Hasskarl took charge of the experiment in 1855, another site was selected at Tjibodas, half a mile from Tjipannas, and 4400 feet above the sea. These places are about thirty miles South of Batavia; and some smaller plantations were also established on the south side of the great Malawar range, eighty-five miles from Batavia, and about twenty from the south coast, in the Preanger regency. Tjibodas and Tjipannas were found unsuitable localities, owing to the shallowness of the soil, the want of shade arising from the unwise felling of the trees, the attacks of rhizanths, and the strong S.W. gales during the rainy season.

Species introduced by the Dutch.—In 1858, Dr. Junghuhn, an eminent Dutch naturalist, took charge of the experiment, and formed another plantation at Wonodjampi, on the eastern and driest side of Java, 6830 feet above the sea. At that period the list given of cinchona plants in Java was as follows:‡—

80	*C. calisaya*, raised from Weddell's plant and from seeds.
13	*C. lanceolata*. This is a very doubtful species.
3	*C. lancifolia*, raised from Dr. Karsten's seeds.
148	*C. ovata*. This also is a doubtful species.
244	

With regard to the *C. lanceolata*, a plant was so named by Ruiz and Pavon, but

* Raised from Dr. Weddell's plants.

† Namely, of *C. amygdalifolia*, *C. pubescens*, *C. ovata*, Ruiz and Pavon's variety.

‡ Bonplandia, March 1858.

Weddell exeludes it from the list of cinchonas.* The *C. ovata* was so called by Hasskarl, but Dr. Junghuhn, as will be seen below, has changed it to *C. lucumæfolia*, which it cannot well be, as that varicty of *C. condaminea* does not grow in any part of the country visited by M. Hasskarl, who obtained the seeds of this plant. It is probably a speeies of no value. The following is the list in 1860, obtained by Dr. Macpherson:—

C. calisaya	15,819	
C. lucumæfolia...	9,20,068	*C. ovata* of the former list.
C. lanceolata ...	45	
C. succirubra ...	35?	
C. lancifolia ...	14	
	9,35,981	

Results of the Dutch Experiment.—The experiment is now in eharge of Dr. Junghuhn and Dr. de Vriese, a profcssor of ehemieal seicnce in Leyden University; and it appears that considcrable sueeess has attended their efforts to propagate the plants; though Mr. M'Ivor, the Superintendent of the Government gardens at Ootaeamund, eonsiders their system of culture to be most erroneous. The sites seleeted appear, from the reports, to be suitable, having been chosen as nearly as possible according to the descriptions given by Meddell and Poeppig, though not by any one who has personally examined the situations most favourable for the growth of einchona-trees in their native forests. Thus no advantage can be obtained from comparing the sites of the Java plantations with those which have been chosen in India, the former having been selected by persons unacquainted with the einchona forests, and the latter by myself after having carefully examined the native habitat of those plants in Peru.

Organization of the attempt to introduce Cinchonæ into India.—When, in the summer of 1859, my serviees were accepted by the Secretary of State for India, to conduet the attempt, then in eontemplation, to introduee einehona plants into India, I determined to take measures, as before stated, for procuring at least six of the most valuable species, scattered over four distinet regions separated by many hundreds of miles from each other. The regions referred to are Caravaya, the region of *C. calisaya*, in Southern Peru; Huanuco in Northern Peru, where the species yielding grey bark are met with; Ecuador, the home of *C. condaminea* and the red bark speeies; and New Granada, where the *C. lancifolia* is found. Unfortunately I was only able to organize attempts in the three first of these einchona regions.

Chief requisites for such an enterprise.—It will easily be imagined that the diffieulties and dangers of such an enterprise, as well as the numerous risks of unavoidable failure, were by no means eontemptible. The chief requisites for those engaged in colleeting plants and seeds were a thorough knowledge of the eountry, the people, and the languages, as well as an intimate aequaintance with the forests and the valuable speeies of einchona-trees, rapidity in performing the work, which is equivalent to economy; and tact to ward off the jealousy of a benighted Governmcnt and the fanaticism of an ignorant people, who imagine that their trade will in some way be injured by the introduetion of quinine-yielding plants into other countries.

The Caravaya region.—I myself undertook the Caravaya region, the locality where *C. calisaya* is found, having, during my previous travels, become acquainted with the forests of Southern Peru. For procuring the species in Ecuador, I seeured the serviees of Mr. Spruee, a very exeellent botanist, who is thoroughly acquainted with the eountry; and for those in the forests of Huanuco, I employed a Mr. Pritehett, who had also passed some years in South Ameriea.

There is not spaee here to give a detailed account of my proceedings in Peru, more espeeially as my Reports to the Under-Secretary of State for India have already been published;† as well as a paper, giving a geographieal account of the eountry which

* Weddell admits 19 speeies of einchonæ, and makes 2 doubtful. Out of the 19, only 8 are of the least value for obtaining quinine or einchonine. He excludes 73 plants once called Cinehona.

† In the 'Madras Times,' November 2nd and 5th.

was the scene of my labours, communicated by me to the Bombay Geographical Society.*

It will be sufficient here to say that, after much hard work and difficulty, and after having overcome considerable opposition from the native authorities, both in the interior and on the coast, I succeeded in embarking fifteen Wardian cases, containing 456 plants of valuable species of *Cinchonæ*,† the vast majority being *C. calisaya*.

A few were left at Kew gardens, and the remainder reached Ootacamund, in the Neilgherry hills, last October; where, owing to the intense heat of the Red Sea, nearly the whole of them have since died. A second, though much smaller supply, will, however, be sent from England next autumn; and I also expect to be able to procure seeds of *C. calisaya* from South America.‡ This unfortunate resul twas owing to the extreme length of the voyages, and the heat to which the plants were exposed; and it is now much to be regretted that a steamer was not furnished to convey the plants direct from the West coast of South America to India, in which case I feel assured that a large proportion would have been saved. It is right, however, to add, that out of M. Hasskarl's collection, which had the advantage of being conveyed from Peru to Java by the direct route, only two plants survived out of 400.

The Huanuco Region.—Mr. Pritchett also succeeded in procuring a supply of plants and seeds of *C. nitida* and *C. micrantha*, yielding grey bark. The plants were also destroyed by the heat of the Red Sea, and when they reached Bombay last December, they were in a hopeless condition. The seeds were forwarded to the Government gardens at Ootacamund, and at once sown.

The Ecuador Region.—The labours of Mr. Spruce, in Ecuador, have likewise been crowned with complete success; and his very able and interesting report§ is evidence of the zeal, perseverance, and ability with which he has performed the duty entrusted to him. A large parcel of seeds of the red bark species has already arrived in Bombay, and been transmitted to Ootacamund; and Mr. Spruce has also collected fifteen Wardian cases full of young plants, which, however, have not yet arrived.‖ Severe illness prevented him from also procuring plants and seeds of the *C. condaminea* during the year 1860, but I have no doubt that he will succeed in doing so in the ensuing season, if his health will permit it.

Success in South America.—Thus it will be seen that the arduous labours of all those who have been engaged in the important service of collecting these valuable plants, were completely successful, and quite equalled the most sanguine expectations that could have been entertained, so far as the duties of collection in South America were concerned. The conveyance to India entailed difficulties and dangers to the plants which it was not possible entirely to surmount. In an enterprise of such great importance, and surrounded at every step by so many dangers, more than one disappointment was of course anticipated, and precautions were accordingly taken so as to render eventual failure as nearly impossible as any human enterprise can be.

Precautions to ensure final success.—In the event of the loss of all the plants of *C. calisaya*, and of all the seeds of *C. nitida*, *C. micrantha*, and *C. succirubra* which have already arrived in India, there is a depôt at Kew of other plants of *C. calisaya*, and of seeds of the other species, which are germinating, and coming up in great numbers. Other supplies of seeds have also been sent to Ceylon, as well as to Trinidad and Jamaica; and finally additional remittances can be procured from Mr. Spruce in Ecuador, as well as from correspondents of my own in Southern Peru.

Present prospects and expense of the undertaking.—Such is the very promising appearance of this interesting experiment, presenting, as it does, an almost certain pro-

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* In the 'Bombay Times and Standard,' November 30th, 1860.

† Namely *C. calisaya* (*var. vera*), *C. calisaya* (*var. β josephiana*), *C. calisaya* (*var. moroda*), *C. ovata*, (*var. communis*), *C. ovata* (*var. β rufinervis*), *C. micrantha*.

‡ I was prevented from procuring seeds last August, after my collection of plants was completed, through the obstructions put in my way by the Peruvian authorities to hinder my return to the forests.

§ Published in the 'Madras Times' of January 10th, 1861.

‖ *Note by Dr. Birdwood.*—These plants arrived on 28th March, and were forwarded on 30th to the Neilgherries, *viâ* Calicut, and are reported to be thriving most satisfactorily.

spect of ultimate success; and it is not a little satisfactory that, considering the nature of the service, and its vast importance, it has been quite the reverse of expensive. The Dutch Government, I am told on the authority of the 'Gardeners' Chronicle,' expended the sum of £10,000 on the single expedition of M. Hasskarl, to procure one species of cinchona, in one particular locality; while the present experiment, including all the expenses connected with three distinct enterprises to widely separated regions, will cost under £4000. Surely this is a small sum, to secure a certain and cheap supply of a drug which now costs the Government £50,000 a year for India alone.—*Transactions of the Medical and Physical Society of Bombay.*

(*To be continued.*)

ON THE INEFFICIENCY OF HENBANE AS USUALLY PRESCRIBED.

BY M. DONOVAN, M.R.I.A.,

HONORARY MEMBER OF THE PHILADELPHIA COLLEGE OF PHARMACY.

The Henbane plant is believed to be highly poisonous in all its parts. Sir Hans Sloane mentions that some children who had eaten a few of the seeds were, amongst other symptoms, overpowered by profound sleep, which in one case continued for two days and two nights. Dr. Patouillat reports the roots to have produced a singular kind of madness, and other formidable symptoms. Dr. Stedman says that seven persons in Dutch Brabant, having eaten the leaves boiled in broth, were soon seized with giddiness, stupor, and high delirium.* It was estimated that from fifteen to twenty leaves were boiled in about ten quarts of broth, and not quite half of that quantity was eaten.

Statements of this kind have induced a timidity amongst medical practitioners which has caused this narcotic to be administered in doses which, whatever the imagination of patients may have represented to the contrary, could have very little if any effect. I have known the tincture prescribed in as many drops as would be given of laudanum, and because the patient chanced to sleep, he deemed the dose sufficient. Bolder practitioners have given a drachm, and others have ventured on two drachms. Never having been able to learn from reliable authority that any of these doses had been followed by unmistakable effects, I made some experiments, first on myself and then on others who volunteered their chances, in order to ascertain if the degree of caution observed in the administration of this medicine were founded on an exaggerated appreciation of its powers. The trials were made with plants of two years old, the very large stalks being rejected.

Having prepared some tincture according to the precept of the Dublin Pharmacopœia, I commenced with taking one drachm. No effect followed. In a month after, I took two drachms without any effect. In another month I took half an ounce, and as before without any result. In some weeks after, being troubled with a cough, I took six drachms, supposing that if the plant had any narcotic power this would be a good opportunity for testing it: there was not the slightest effect. I subsequently swallowed an ounce at one dose without observing the manifestation of any power. My apprentices at different times satisfied themselves as to the incapability of five or six drachm doses of this tincture. I had frequently tried one-drachm doses, repeated at intervals of two or three hours, on persons variously affected, but could not discover any consequences.

All the tinctures used in these experiments had been made with henbane cultivated in gardens. It occurred to me that perhaps the plant is rendered powerless by cultivation, and I determined to make trials of it in the wild state. For a long time I did not succeed in obtaining such; but at length, by the kindness of Ven. the Archdeacon Cotton, I received a supply of wild henbane collected by him in a mountainous district of North Wales, which he sent to me the day after it was gathered.

The herb being divided into equal parts, one part was immediately and carefully

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* This property was well known to the ancients. From the Greek name of henbane is derived a Greek verb which signifies to grow mad, like one who had eaten the plant.

dried, powdered, and made into a tincture of the strength indicated by the Dublin Pharmacopœia, the larger stalks having been removed. The same trials were made with this tincture as with the former: at distant intervals I increased my own dose, drachm by drachm, until it amounted to an ounce. Another person took seven drachms at once, and would have gone further had there been any use in so doing. In none of these experiments was any effect observable; and as these doses were totally powerless, we may safely infer that much larger ones might be taken without danger.

As an opinion has sometimes been entertained that medicinal plants, in their recent state, possess more energy than those which have been dried, I made a tincture of the portion of the Welsh henbane which had not been dried. The tincture was made on the day on which the plants arrived, and, on account of the watery juices which they contained, rectified spirit was employed; the ratio was seventeen ounces of the plants, the great stalks being rejected, to forty ounces of spirit. After digestion for three months, the tincture was tested by similar trials as with the former on two persons; an ounce mixed with water was swallowed by each, but there was not the slightest manifestation of medicinal power. I had no means of determining whether seventeen ounces of recent leaves were the equivalent of ten ounces dried, as directed in the Pharmacopœia, but I imagine there could not be much difference.

Thus, I think it is proved that the wild plant has no more discoverable power than the cultivated, and that neither of them manifests any medical power in the doses usually prescribed, or in much larger ones.

With regard to the extract of henbane, I can only say that a few years since an apprentice of mine swallowed ten grains of it at one dose without perceiving any consequences. The extract was London made, and the plant the growth of Mitcham.

These statements ill-accord with the flattering accounts given by Stoerck of the effects of henbane in various diseases, but in which it was found useless by Drs. Greeding and Cullen. Perhaps the geographical situation in which the plant is grown may make a difference; in Stedman's case it was grown in Dutch Brabant; in Patouillat's case it was the growth of France, the roots being the part made use of. Perhaps in any case the roots would be active. From various published accounts it would appear that the seeds would furnish an energetic tincture, in which case the tincture of the leaves might well be abandoned.

Some may object to the foregoing statements that the effect of any medicine on a person in health is not a proper criterion of its efficacy in disease: but if we find that in health a certain dose has *no effect whatever*, it is difficult to believe that the same dose in ordinary and trivial cases of indisposition could be efficacious. I think the instances I have given of its incapability, even in large doses, of allaying a slight tickling cough, which would have been relieved by a few drops of laudanum, bear upon the subject. It is to be recollected, however, that the main object of these observations is not to prove that henbane is, under all circumstances, altogether worthless, but to show that prescribers in this country are over-cautious in its administration. The fact that the energetic poison called Hyoscyama is obtained from this plant proves that, at least in some countries, caution is required; but I am not aware that this alkaline principle is procurable from henbane of the British Isles, unless perhaps in infinitesimal quantities.

In reference to the above we insert the following letter from Mr. R. M. Forsayeth, 'Dublin Medical Press,' April 9th :—

"Sir,—In a recent number of the 'Medical Press' I read an article upon the 'Medicinal Effects of Tincture of Henbane,' from the pen of Mr. Donovan, the distinguished pharmaceutist of Clare Street. If it had emanated from any other source, it might almost have passed unnoticed; but as I am in the daily habit of prescribing that medicine, I may be permitted to make a few remarks upon it. In the first place, I may preface that I am in the habit of prescribing one to two-drachm doses to ease pain or procure sleep; the latter most readily obtained by adding five minims of chloroform to the drachm of the tincture. This I have repeatedly observed to afford calm and refreshing sleep. 2ndly. Is tincture of henbane powerless in any or such large doses as described by Mr. Donovan—one to six drachms? I happened accidentally

to grow what I use in my own garden—an *annual*, never living through winter. I take up the plant after being in flower, dry it in the kitchen, cut up leaves, seed vessels, and small stems, and make the tincture five ounces to thirty-two spirits. This tincture presents very different sensible qualities from what is usually sold in shops. I do not understand how Mr. Donovan digested ℥xl spirits to ℥xvij leaves. It could scarcely moisten such a large bulk. The *seeds* are evidently very active, a *single small one* having one day unobserved fallen into the corner of my son's eye, and dilated the pupil to an extraordinary degree. I can only account for the results of Mr. Donovan's experiments by the supposition that the *biennial* (if such there be) is *inert*, or that it may have been damaged by drying or otherwise. I would therefore caution my medical brethren who read the 'Press' to be careful before they prescribe such large doses as six drachms; for if the tincture was properly prepared—as I make it—serious or fatal symptoms might suddenly supervene upon the exhibition of such heroic doses."

The following is Mr. Donovan's rejoinder:—

"In a late number of the 'Dublin Medical Press,' March 19, I gave an account of some experiments made by myself and others relative to the very large doses in which tincture of henbane (P.D.) had been taken by us with impunity, indeed without any perceptible effect. Dr. Forsayeth has cautioned the profession against acting on my statements, because he has, or thinks he has, obtained results different from mine. I imagine the profession needed not the caution, as it is not likely that ounce-doses will on a sudden be administered because I swallowed it in that quantity without effect. As Dr. Forsayeth has called in question my statements, it is incumbent on me to defend what I wrote, as it relates to a somewhat important point in practice.

"I stated that the tincture used by me was made from the biennial *Hyoscyamus niger*. Dr. Forsayeth seems to consider biennial hyoscyamus a myth, and alluding to it says, 'if such there be,' because what grows in his garden and is used by him is an annual, and perishes every winter. Now it is well known to botanists that there are two varieties—annual and biennial;*—nay more, the biennial is said to be the variety which possesses whatever medicinal power the plant possesses. In a paper read before the Medico-Botanical Society some years since, Mr. Houlton says: '*Hyoscyamus niger* is a biennial plant, and is in a fit state for medical purposes in the *second year only* of its duration, when in flower.' 'The leaves at this period differ very much from those of the first year.' 'The difference in their relative strength is great.'

"The matter stands thus: I used the biennial variety in the second year of its growth; but because Dr. Forsayeth grows and uses the annual variety, he calls in question my results, throws a doubt upon the very existence of the plant used by me, and used upon good authority.

"We are, however, at issue about the medicinal power of henbane. I found no effect from swallowing an ounce of the tincture: a fellow experimenter was not more affected by a similar dose. Dr. Forsayeth says, he finds one or two drachms sufficient to ease pain or procure sleep, the latter more readily by adding five minims of chloroform to each drachm of tincture,—that is ten minims to the two-drachm dose. This he has repeatedly observed to produce calm and refreshing sleep. I have known the same effect from that quantity of chloroform without any henbane. It must be recollected that when chloroform is of full specific gravity, ten standard minims are equal to forty drops, let fall from the lip of a proper ounce bottle: it must also be recollected that chloroform is one of the ingredients in Dr. Collis Browne's Chlorodyne, and is, no doubt, used to assist in producing the effect for which the latter is valued. The argument therefore stands thus:—I failed to obtain any effect from a certain thing; Dr. Forsayeth succeeded in procuring sleep from something essentially different: his facts have therefore no reference to mine.

"In order to ascertain whether tincture of henbane obtained from any other source would differ in medicinal agency from mine, I obtained some ounces from the Apothecaries' Hall, where it is to be presumed articles are prepared as they ought to be. Of this, I and my apprentice (Mr. White), after one or two cautious trials, swallowed, each

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* "There are two varieties of this species; one biennial and the other annual."—*Pereira*.

of us in the presence of the other, an ounce mixed with water. There was not the slightest effect produced on either of us.

"Dr. Forsayeth finds it necessary to caution his medical brethren against the large doses taken by me and my fellow-experimenters; for he says, 'if the tincture was properly prepared, as I make it, serious or fatal symptoms might suddenly supervene.' He adds, that his tincture 'presents very different sensible qualities from what is sold in shops.' Dr. Forsayeth's skill in preparing this tincture may be as superior as he supposes; but I venture to remind him that, after all, his tincture is not 'properly prepared,' for he uses five ounces of leaves to thirty-two ounces of spirit, while the Pharmacopœias of all the Colleges of Physicians direct five ounces of leaves to forty ounces of spirit: well may the sensible qualities of his tincture be very different from what is sold in shops. If the plant be as energetic as Dr. Forsayeth supposes, why increase the strength of its tincture in the ratio of 5 to 4 beyond what physicians expect or desire?

"Dr. Forsayeth can only account for the results of my trials by supposing that my biennial plant, '*if such exist*,' was damaged in drying. I beg to decline this apology for my results. I had expressly stated that some of my experiments were made with henbane which had not been dried,—that had been growing the day before amongst the mountains of North Wales: and with regard to my other experiments, I hope that, without presumption, I may claim some experience in methods of drying plants without rendering their tinctures powerless.

"Dr. Forsayeth says he does not understand how I 'digested 40 ounces of spirit on 17 of leaves; it could scarcely moisten such a large bulk.' I shall tell him how this feat was accomplished: it was by forcing the soft recent leaves into a wide-mouthed bottle, ramming them down with a blunt stick; they were thus easily submerged when the spirit was poured on."—*Dublin Medical Press*, *April* 30.

DEEP WELL AT BRIGHTON.

Well-digging is a subject sometimes treated upon in the pages of the 'Gardeners' Chronicle,' and it may not be altogether uninteresting, or without its use to others who may be engaged on similarly extensive works, to record the success which has recently been accomplished in this way at Brighton. There was a scarcity of good water in that town, and it had become absolutely necessary to obtain a supply which should be copious in quantity and good in quality. After the lapse of a long time, and with considerable expense and trouble, this result has been attained; the water came gushing into the well at the Warren Farm on the 23rd of March, when it had been dug to a depth of 1285 feet. The bells pealed forth in testimony of the public rejoicing; the ratepayers, who had begun to think that there was unusual wisdom in the old maxim "'Tis better to let the well alone," now went about congratulating each other; and of course there has been the usual amount of complimentary speech-making at public dinners. Mr. Henry Catt, a gentleman of Brighton, who is well-known for his geological attainments, and who has naturally watched the operations with great interest, gave a dinner to the workmen, and they were afterwards presented with a silver medal each, struck to commemorate the event. Mr. Huggett, the Superintendent, received one of the same, struck in gold, as a testimony to the energy and perseverance he has all along displayed.

The well at the Warren Farm was commenced in March, 1858, by Mr. Samuel North, who had contracted to sink it 400 feet, which, as it would have been some 30 feet below the level of the sea, was about the depth at which it was expected that water would be found. This shaft was 6 feet in diameter; after sinking it nearly 38 feet deeper than was specified in the contract without obtaining water, Mr. North gave up the affair. Two horizontal borings, each 30 feet in length, were then made, one at a depth of 418 feet, and the other a little lower in the opposite direction, but still without success. It was then determined to carry the shaft downwards again, but this time only 4 feet in diameter. Operations were continued night and day, and at length, when a depth of 1285 feet was attained, the water came gushing in most plentifully. The men who were last engaged at the bottom of the well said they had been

digging all day, and although they had sent as much stuff as usual to the surface, yet they seemed to get no deeper. There can be no doubt that their statement was correct,—the extreme pressure of the water was forcing up the green sand in which they were working, as fast as they could remove it. The water burst through with a loud report, and most fortunately when no one was at the bottom; it was just at the time when the men were shifted. This was a most providential occurrence, for doubtless had it been at any other time, several lives would have been lost, as the water came in so rapidly that three-quarters of an hour after it burst through, there was a column of water 400 feet high; the workmen who saw it say that the surface appeared as if boiling from the force with which it came in. Platforms had been erected about 100 feet apart in the lower well, and several of these were under water before the tools, etc., could be removed; in thirty-six hours it had risen to above 800 feet. Mr. George Maynard, the surveyor, reports that the water is very pure, and that its specific gravity is scarcely greater than that of distilled water.

So far all is satisfactory; with regard to the cost of the well, now that water has been obtained, the ratepayers seem to consider that it was at a very moderate price. The total cost, the official report tells us, was £6583. 4*s*.; so that every person residing in a house of the annual rent of £20 will have had to pay about 10*s*., and others in a similar proportion.

Looking at the well simply in a geological point of view, it is very instructive. Even at the present day there are still people who look upon the speculations of science as of little practical utility; they sneer at the suggestions which they call theoretical. Such men should learn a lesson from an instance like that of which we are speaking; perhaps they will, but they are not the men to learn, though facts as clear as possible be placed before them. In this case, as in many others, science had predicted the result, and the circumstances prove beyond a doubt that those predictions were founded upon trustworthy grounds (although they were purely theoretical), for they were literally fulfilled. Scientific men had said that if water was not found upon the top of the bed of clay know as the Gault, there would surely be a plentiful supply in the Lower Greensand. The stratum last named had not been penetrated more than 2½ feet when the long-desired water came gushing in as we have seen. It is this same stratum which is said to feed some of the large ponds found in the county. Sir Roderick Murchison and the officers at the Museum of Practical Geology gave many valuable suggestions during the progress of the works, and probably the well might have been abandoned long ago had it not been for the confidence with which they predicted ultimate success. The only thing which was not anticipated by them was the great thickness of some of the strata; but that, of course, could not be foreseen, as there was no section of the beds in the immediate neighbourhood. The well was sunk at first through the upper chalk, and then came the lower chalk, distinguished from the upper stratum by the absence of the bands of nodular flint which form so striking and characteristic a feature of the upper chalk. The lower chalk was found to be 168 feet in thickness. Then came a stratum of grey with patches of blue marl 172 feet thick, followed by a blue marl with occasional veins of grey for 150 feet further. This in its turn was succeeded by a stratum of sand and clay, which from its looseness rendered it necessary to "stein" the sides of the well as the men proceeded. At 968 feet from the surface the Upper Greensand made its appearance: it was pierced, as was also the gault, without success; the gault was developed to a much greater thickness than had been anticipated; it was, however, finished at 1228 feet from the top of the well. Then came a few green and brown sandy layers, and at last the true Lower Greensand beds were reached, and the result has already been stated.

The heat and the pressure of the air upon their bodies rendered it extremely difficult for the men to work at such a depth; six hours was quite as much work as they could get through in the day. Still the work was carried on continuously by constant relays of workmen, and no one rejoiced more in the success which has crowned their exertions than those men by whose labour it has been brought about. Many wells have been bored to a depth as great, or even greater than this; but I do not know of one which has been dug to such a depth. C. W. C.

[Suppose this well had been bored, not dug, how much would the ratepayers have saved? Two-thirds?]—*Gardeners' Chronicle.*

THE TRADE IN LIQUORICE.

BY P. L. SIMMONDS, F.S.S.

The increasing importance of the trade and manufacture of Liquorice induces me to pen a few remarks on this article of commerce. The consumption in England has hitherto been about 1200 to 1500 tons a year, but in North America the consumption had reached 4000 to 5000 tons per annum previous to the war. The reason why so much more was consumed in the States than in England was the much lower rate of duty imposed, and its extensive use in manufacturing tobacco,—liquorice-juice being found not only an excellent preservative to the leaf, but also beneficial in mitigating the evil effects arising from the extensive practice of chewing and smoking carried on there.

The chief obstacles to extended consumption in England have hitherto been the high price, the high rates of duty, and the great impurity and adulteration of both foreign and home-made sticks and piping. Henceforward the consumption is likely to increase enormously in the United Kingdom, liquorice-paste having fallen in price from 90*s.* to 45*s.* under the influence of the removal of the duty by Mr. Gladstone, and the cessation of demand in America. Liquorice sticks, the best that can be made from Spanish and Italian root, are now sold at 100*s.*, and a very good pure article at 60*s.* to 70*s.* made from Levant roots.

According to the experiments of Overbeck and others, the better sorts of liquorice contain from twenty to forty per cent. of foreign substances, which remain behind as sediment, some of the lower qualities having as much as eighty per cent.; hence it would seem that the manufacturers add some powder to the liquorice in order to keep it dry. Besides the proportion of soluble extract, the colour and taste may also serve as tests for the quality of commercial liquorice. The solution of some inferior qualities is dark-coloured and sooty, and the sediment blackish-brown; whilst that of the better qualities is light-brown, and can easily be extracted. The best sorts of liquorice juice from Calabria are obtained from Martucci, Ferrara, and Cassano, provided with their stamp; these sorts contain 62 to 67 per cent. of soluble extract, and 17 to 26 per cent. of insoluble dry residue.

Two species of *Glycyrrhiza*, or liquorice, have been employed on account of the sweet underground stem, called liquorice-root: these are *G. glabra*, common or smooth liquorice; and *G. echinata*, echinate-podded liquorice. The rhizomes furnish, on decoction, a dark-coloured extractive matter, containing a large proportion of sugar. This is inspissated by boiling to a consistency for rolling into paste, when it is wrapped in bay-leaves, and put into small boxes of a half to one cwt. for confectionery purposes, commonly known as Spanish-juice, or Solazzi.

The root of this plant is the useful part, being replete with a sweet, balsamic, pectoral juice, which is either extracted, or the wood sold in substance. It is much used in all compositions for coughs, sore throats, and as a demulcent pectoral; but by far the greatest quantity is used by brewers. The common liquorice is cultivated in most countries in Europe for the sake of its roots, but in Spain and Italy, and particularly in Sicily and Calabria, it makes a considerable article of commerce with this country. In Calabria liquorice is chiefly manufactured and exported from Corigliano, Rossano, Cassano, and Palermo. The Calabria liquorice upon the whole is preferable to that coming from Sicily, and the Italian paste to that coming from Spain. Liquorice also grows in great abundance in the Levant. The boiling requires the utmost care and precaution, as the juice takes an unpleasant smell and flavour, if burnt in the least degree. This paste is manufactured from the month of November till March, the warm season being very unfavourable for it; so much so, that it is not advisable to ship any in summer, as it easily runs into one mass in the boxes, and then is only to be sold for damaged liquorice. The round sticks are preferable to the flat ones, and the good quality is to be brittle, bright, without pores, and of a good fragrant smell.

In this country about fifty acres are under culture at Mitcham with the smooth liquorice, and much more at Pontefract. Twenty cwt. of root per acre may be reckoned a fair crop. The expense of taking up the root by the fork costs £10 to £16 per acre.

The same ground will answer for liquorice for many years in succession, but it requires a plentiful supply of manure. No return is obtained until the third, fourth, or fifth year. The roots are usually taken up with a three-pronged fork, and stacked in trenches until wanted. The stacking is effected in a moderately dry and sheltered place, the roots being placed upright, with layers of earth between them, and a layer of several inches thick on the top. In this manner the stock is preserved in good order for several months. They are taken out when wanted, by hundredweights, and before being sent to London are deprived of their crowns by chopping. The fibres and small branches which are removed in trimming are called *offal*, and were formerly dried and ground to powder, and much used by chemists for rolling pills, in order to give consistency and substance to the compound.

This well-known vegetable product was equally familiar to the ancients, who also used it medicinally. Under the name of Pontefract Cakes, small liquorice lozenges, stamped with the arms of the town from whence they take their name, are still sold by chemists and druggists.

The foreign root is sometimes imported from San Sebastian and the Papal Territories into London and Liverpool in small bundles of 60 to 70lbs. each, for the use of druggists. It is grown and manufactured to a considerable extent in the provinces of Seville, Valencia, and Catalonia, in Spain. The liquorice-root grows wild in many parts of Greece, and especially in the province of Achaia, at Corinth, Phthiotes, and Missolonghi, in great abundance; its quality is considered very good, and has induced many to undertake its manufacture. But the number is now much reduced, owing to the cultivation of the land, which makes the root scarce. One manufacturer at Patras, Mr. George Congos, used to prepare yearly more than 40,000 oques of liquorice-juice. The Greek root is said to be sweeter than that found in Sicily and Spain, hence the juice contains a greater quantity of saccharine matter than that made in Calabria.

The following figures from the Official Trade Returns, show the sources of supply in 1860. The duty, which had been 18*s.* per cwt. on Paste from British Possessions, and £1 on foreign make, from 1846, and £1 per cwt. on all kinds of Juice from August 26, 1853, was abolished on March 7, 1860:—

Liquorice Paste.	Quantity. Cwt.	Computed Value.
France	757	£2479
Spain.....	981	3372
Naples and Sicily...	5707	19,780
Turkey	16,790	33,578
Other parts	829	2785
	25,064	61,994

Liquorice Juice.	Quantity. Cwt.	Computed Value.
France	772	£2704
Spain.....	101	383
Sardinia.....	34	202
Tuscany.....	97	572
Two Sicilies	5663	32,807
Other parts	186	792
	6853	37,460

In France there is an extensive use of liquorice-water in the promenades and public places, under the name of "Coco." Under the name of "Erqooss" it is also sold extensively as a drink in the streets of Turkey and Egypt, in the manner of sherbet. Liquorice is slightly laxative and cooling, anti-scorbutic, and, unlike other sugars, quenches thirst. The saccharine, or extract of liquorice, is of a very delicate character, and easily destroyed by burning or oxidation on boiling. Recently, under a patented process, the application of the vacuum pan, as in sugar-boiling, has been attended with great advantage. The result is a much better article than that made by the rough processes in use in Spain and Italy.

The price of liquorice is very little guide to quality; some foreign brands, and some forgeries of the same, selling at 120*s.* to 150*s.*, and even 170*s.*, when perfectly pure extract of the root can be had for 50*s.*, and sticks superior to any others at 100*s.* Purchasers, to avoid being misled, should examine and satisfy themselves of the actual quality. A rough test, but practically sufficient for all purposes, is that of dissolving and filtering the solution to observe what deposit or sediment remains. The pure extract of liquorice of the shops sold under the name of refined liquorice, is prepared by dissolving it in water, straining and inspissating in the usual manner.

Caution is required on the part of the grocer, that he does not pay £8 per cwt. for an article of less intrinsic value, and containing less glycyrrhizin, or pure extract of the root, than can be obtained for 100*s*.

A new feature in the trade is the introduction of small sticks, weighing from one to one and a half ounce, sold retail at one penny and one halfpenny per stick, instead of those of larger weight (two and three ounces) sold at sixpence per stick.—*From The Grocer.*

ALLEGED NEGLECT IN SUPPLYING MEDICINE.

BAIL COURT, APRIL 30.—BEFORE MR. JUSTICE WIGHTMAN.

DUNGAY *v.* QUILLER.

Mr. M'Mahon and Mr. Gordon Allen were counsel for the plaintiff; Mr. Serjeant Parry and Mr. Lumly Smith for the defendant.

This was an action for negligence.

The plaintiff was a surveyor, and the defendant was a chemist and druggist in Sloane Square. In June last, the plaintiff had a touch of the gout, and he went to the defendant's shop and saw his assistant, and told him he was recommended by the beadle to come there for some Smith's Gout Pills. The assistant put some pills in a box, and gave it to the plaintiff, and wrote a direction that one was to be taken twice a day. Plaintiff asked him if there was any colchicum in the pills. The assistant said there was not. He then asked him if there was anything likely to give him cold, as he walked about in the wet. The assistant said there was not. Plaintiff asked him if they were good pills, and he said he believed they were. Plaintiff asked him, if two did not do him good, whether he might take three a day. The assistant said he might. The plaintiff paid eightpence for the box, and went away. He then took two pills on that day, the 2nd of June. The next day he took two or three, and on the third and fourth days he took three. After he had taken the last of the pills he found himself very ill—great trembling in the limbs. He went to his doctor, Mr. Goodrich, who told him to go home directly. He was ill in London till September. He was for three weeks unconscious. On the 15th of June plaintiff's wife wrote to the defendant. He was afterwards sent to Margate, where he remained a fortnight. Had suffered from gout for many years. Had taken Bagster's pills, which had been recommended by his maid-servant, as they had done her father good. Smith kept the Star and Garter. The beadle told plaintiff he was obliged to leave off taking the pills, but they had done him good in the first place, but he recommended plaintiff to try them. During the illness of the plaintiff the pillbox was shown to the defendant, and he was told he had made a mistake. He was asked how much calomel there was in each pill. The assistant said about 2½ grains. The defendant said, "Oh no, only one grain."

Mr. Francis Goodrich said he saw the plaintiff in the early part of June. He was in bed; his face much swollen, his tongue out of his mouth. He could not articulate. He was in a high state of salivation. He must have taken some preparation of mercury. He was ill for many weeks. It was not proper to give him mercurial doses at the rate of two grains a day. The plaintiff's health had suffered much and was permanently injured. His life was in danger. My bill would be about one guinea a week for ten weeks.

Cross-examined.—I have known plaintiff for twenty years. He has suffered from chronic gout. I might have given him a blue pill.

The defendant had offered to pay something towards the plaintiff's expenses.

Mr. Serjeant Parry submitted that there was no proof that the defendant had warranted the pills to cure the plaintiff, or that they were fit to be used by the plaintiff, nor that the defendant promised to give plaintiff skilful advice.

The learned Judge thought the case must go to the jury.

Mr. Serjeant Parry then addressed the jury for the defendant. It was a very important matter to both parties, but particularly to the defendant, whose duty it was to take care that medicines were properly prepared, but not to give advice. The plaintiff

had suffered through his own obstinacy in doctoring himself, and taking the advice of the beadle and his servant-maid, instead of going to his medical man. The defendant had sold the plaintiff what he asked for. Gout was not a complaint that obtained much sympathy, because it was supposed to arise from many hours of social enjoyment; but persons if they had the gout did not run after the parish beadle for advice, and then rush into the first chemist's shop and ask for the beadle's remedy. It would, however, be shown that the pills were perfectly innocent: they were prepared under the direction of Mr. Smith, the landlord of the Star and Garter Tavern, in the King's Road, Chelsea, who had received great benefit from taking them. The plaintiff had asked for Smith's Gout Pills, but he had not told the assistant that he had been suffering from chronic gout. Smith's pills were given to him, and he took them home, and concealing them from his medical attendant, he had taken advantage of the advice of the beadle contrary to the express wish of his wife. The assistant would deny that he had told the plaintiff he might take three pills a day. Mr. Smith would be produced, for he was still alive, and believed it was through taking those pills that he was now alive. People who suffered from attacks of gout would run to any one for advice, and would take anything, and often double the quantity of anything, that was recommended to them. Mr. Smith had given the prescription, which was this:—Calomel, 1 grain; colchicum, 1 grain; jalap, 1 grain; ipecacuhana, 1 grain. Lewty, the assistant of the defendant, had made up the pills, and each pill contained this quantity. Many medical men would state that it was a gout pill.

Mr. Lewty said he had made up the pills. The plaintiff asked him for Smith's Gout Pills, and he gave him a box, and wrote upon the box, "Two pills to be taken in a day." He might have told him if two did not answer he might take three in a day. A person called some days afterwards, and the defendant said the pills only contained one grain of calomel in each pill. Never heard any one complain of the pills.

Robert Alsopp, the predecessor of the defendant, stated that Smith had brought the prescription to his shop, and he sold them. There was a good demand for them. Never had any complaint about them.

Mr. Smith became acquainted with the pills in 1850. He had the gout, and took the pills, and now suffered but little from that complaint. Recommended them to hundreds, but not to be taken as the plaintiff had taken them.

Mr. Redwood, Professor of Chemistry, had analysed the pills, and found each pill weighed four grains, one of which was calomel.

Dr. Andrew Barclay.—One of these pills taken twice a day was not injurious. They might be taken for the gout in suitable cases. Of course he should inquire into the state and habits of a patient before prescribing for him. Mercury had a different effect upon different constitutions. Five grains taken within twenty hours would not be advisable. Calomel ought not to be taken without the person being watched by a medical man. One grain in some cases would produce salivation.

Dr. W. Pettigrew.—This was a gout medicine, if taken carefully.

Mr. W. Rendle, surgeon of thirty years' practice.—This was a good usual medicine, but persons should consult a medical man. The other ingredients would diminish the action of the mercury.

The jury returned a verdict for the defendant.

MISCELLANEA.

Suspected Poisonings.—At the inquest held respecting the late Manchester tragedy, Mr. Hudson, analytical chemist, stated that he had received six vessels containing the contents of the stomachs of the three children, but had found no traces of poison in either of the vessels. He had examined them for arsenic, lead, copper, mercury, zinc, prussic acid, oxalic and other acids, as well as morphia, strychnine, and all other narcotic poisons. He was of opinion that there are narcotic poisons which might cause death and yet not be discovered. The evidence of the surgeons who made the *post-mortem* examinations was to the effect that there were no appearances indicating poison, and nothing to lead them to suppose that the children had come to their deaths in an unnatural way. The jury returned the following verdict:—

"We find that Evan Meller was wilfully murdered by William Robert Taylor, and that his wife, Martha Ann Taylor, was accessory to it; and we are satisfied that the three children, Mary Hannah Taylor, Hannah Maria Taylor, and William Robert Taylor, did not die from natural causes, but we have no positive proof how or by whom their deaths were caused."

On Thursday evening, May 22nd, Mrs. Vyse, of Ludgate Hill, attempted her life by cutting her throat. In an adjoining room her two children were found dead, and the supposition is that they had been poisoned by their mother, who, it appears, in the early part of the day had purchased of Mr. Keating, chemist, of St. Paul's Churchyard, some poison, assigning as a reason the necessity of destroying the rats with which the house was said to be infested. The inquest was held by Mr. Serjeant Payne at the London Coffee House, when the sale of the poison (which proved to be "Battle's Vermin Killer") to Mrs. Vyse, was proved by Mr. J. N. Taylor, Mr. Keating's assistant. The *post-mortem* examination of the bodies was made by Mr. W. S. Savory, assistant-surgeon at St. Bartholomew's Hospital, who stated that all the organs had a healthy appearance; he had not made any chemical analysis of the contents of the stomach, thinking that in a case of so much importance it was the duty of a professional chemist to undertake the analysis. The inquiry was accordingly adjourned for that purpose.

Deaths from Opium.—The *Greenock Advertiser* states that on Saturday, May 17th, about one o'clock, Dr. J. H. Bryson was found sitting in a chair in the back room of his dispensary, 71, Main-street, Cartsdyke, in a state of insensibility, in consequence of his having taken an overdose of laudanum to relieve the pain occasioned by a spasmodic affection to which he was subject. Dr. M'Fie was instantly called in, and, after administering an emetic, had Dr. Bryson removed to his residence in Hill Street, where he received unremitting attention from Drs. Marshall, Henry, and Stewart, and the house-surgeon of the infirmary. About ten o'clock on Saturday night he had so far rallied as to be able to speak; but about midnight he began to breathe heavily, and gradually sank until about three o'clock on Sunday morning, when he expired. He was about fifty years of age, and has left a widow and five children.

In another case Mr. Bedford, Coroner for Westminster, held an inquest on the body of Leopold King, a cow doctor, who died from the effects of opium. It appeared that deceased received from his mistress some opium, sulphur, and nitre for the use of the cows, and was shortly afterwards found lying insensible in the cowshed. He was promptly removed to St. George's Hospital, where the usual remedies were applied, but without success, and the man died in a few hours. The deceased was in the habit of taking opium, and it is thought that he helped himself to an overdose.

Attempt to Poison by Corrosive Sublimate.—At Aylesbury, March 7, before the Lord Chief Baron, Abraham Kaley, aged 43, was indicted for having feloniously administered to his wife, Mary Kaley, a quantity of corrosive sublimate, with intent to murder her.

Mr. Newton appeared for the prosecution.

It appeared that the prisoner was a labourer living at Wooburn, near High Wycombe. His wife stated that she and her husband had lived uncomfortably together, on account of some jealousy with reference to her alleged misconduct with some other men. On the 14th of January last she and her husband went to a public house in Wooburn, called the Mother Redcap. They had a pint of beer together, and the prisoner then ordered a second pint, part of which they also drank, when the prisoner went out, saying he was going to give a drink to a friend outside. When he came back he gave the remainder of the beer to his wife to drink. The moment, however, that she tasted it she discovered that there was something wrong about the beer. She subsequently became very sick, and suffered severe pain in her stomach. The suspected beer was put on one side, and was produced in Court, with a considerable quantity (said to be about a drachm) of a brownish powder adhering to the bottom and side of the vessel. Mr. Rees, a medical gentleman residing at Beaconsfield, said that he had tested a portion of this powder, and found that it was "corrosive sublimate," an article frequently used by farmers for agricultural purposes. He also said that he had attended Mrs. Kaley, and found her suffering from such symptoms as would be

produced by taking that poison. Another witness also stated that the prisoner, speaking of his wife, had used threatening language.

The prisoner, who was undefended, informed the Court during the progress of the trial that he had been twice in a lunatic asylum.

His Lordship, in addressing the jury, said that the law allowed them to acquit the prisoner of the felony charged in the indictment, and to find him guilty of administering poison to his wife with intent to grieve, injure, or annoy her, if they should think that the expressions attributed to the prisoner were not serious expressions of an intent to take her life.

The jury took this view of the matter, and found him *Guilty* of the minor offence, recommending him to mercy on account of his weakness of mind. The prisoner was then sentenced to fifteen 'months imprisonment, with hard labour.

Attempt to Poison by Acetate of Lead.—At Exeter, March 10, before Mr. Justice Blackburn, Caroline Benmore, aged 14, was indicted for administering poison to her mother, with intent to murder her, on the 18th of January, at Torquay.

It appeared that on the day in question the prisoner made a cup of tea for her mother, who, on taking some of the tea into her mouth, found it had a bad taste; she therefore did not drink it. The cup of tea was taken to a chemist, who found it to contain a drachm of sugar of lead. The mother, it appeared, kept sugar of lead in a cupboard, in a bottle without a label.

The girl was undefended, and appeared to be without a friend to advise her. She at first pleaded "Guilty," and it was not until the question was put in plain language, whether she intended to kill her mother, that she said "Not Guilty."

Mr. Justice Blackburn, in summing up, said the only doubt was whether the prisoner was aware of the dangerous consequences of such an act. Verdict,—*Guilty*, with intent to do grievous bodily harm. The prisoner was sentenced to six weeks' imprisonment, and then to be sent to a reformatory school for five years.

Attempted Poisoning by Laudanum.—At York, March 16, before Mr. Justice Mellor, Richard Buckle, aged 35, was indicted for feloniously administering laudanum to Jane Buckle, his wife, with intent to murder her, at Middlesborough, in the North Riding, on the 26th of June last.

Mr. Blanshard and Mr. Serle prosecuted; Mr. Maule defended the prisoner.

The prisoner was tried in December last (before Mr. Justice Wightman), on the charge of attempting to administer strychnine to his wife, and was *acquitted* (see page 390). On the day named in the indictment the prisoner had gone to a chemist's shop, and had taken with him a small bottle, and asked for some laudanum to rub his wife's gums, as she complained of toothache, and about a quarter of an ounce of laudanum was put into the bottle and given to him. This he took to his wife on the 26th of June, and calling her upstairs gave her the bottle, and told her not to tell her sister what he had given her; she was to take the contents of the bottle, to be quite ready to get into bed, and to take the whole of it. She said she was then better, and did not want it, but on his persuasion she took it, and was very ill afterwards, but eventually got better. The defence urged was, that the prisoner's wife had really complained of toothache, and that her husband had obtained the laudanum for the purpose of giving her relief, but that she had in ignorance taken the whole of it, and nearly poisoned herself. His Lordship having carefully summed up the evidence, the Jury returned a verdict of *Guilty*. Sentence of death was recorded, but intimation was given that it would be commuted to penal servitude for life.

Poisoning by Mistake.—An elderly woman, named Elizabeth Blankley, residing at Epperstone, near Southwell, Notts, died on Friday, April 4th, from the effects of chloride of lime taken by mistake. Being in the habit of taking medicine, she took up a bottle of chloride of lime, instead of her medicine, and swallowed a considerable quantity; two hours afterwards she expired.

Suicides by Laudanum.—On Tuesday, March 11, an inquest was held at the Ship Inn, Trowbridge, on the body of a young woman named Mary Moore, aged 19, who died on the previous day, from the effects of poison. It appeared from the evidence that the deceased was attached to a young man named Pitney, who, being very jealous, had sent her a note previous to her death, in which he stated that

he intended, from some groundless supposition he had formed of her conduct, to leave home, and wander as an outcast. This, it is supposed, so affected her mind, that she determined to put an end to her existence. On the Saturday evening she went to four or five different chemists' shops, where she purchased at each from one to two pennyworth of laudanum; and as the chemists all identified the same bottle, the inference is that she drank each quantity as she purchased it. The jury returned a verdict "That deceased came by her death from the effects of laudanum, administered by her own hands, but there was no evidence to show what state of mind she was in at the time."

Another inquest has been held by Mr. Payne, at St. Thomas's Hospital, on Jane Strickland, aged 42, who died from the effects of opium. The deceased, in consequence of some squabble with her husband, had purchased laudanum and swallowed it. She was conveyed to the hospital by her son, who stated that when they arrived there they could see no one at the gate, and in walking round the gardens they met a porter, who said the surgeons were at dinner, but he would find one. They walked about for a quarter of an hour before a surgeon came, who then ordered the stomach-pump to be got ready. In answer to a question by the Coroner, the house-surgeon said he went immediately he was called to the deceased, and applied the stomach-pump, but it was of no service, the poison having been taken on an empty stomach, had been absorbed. The jury returned a verdict of temporary insanity; at the same time they expressed their opinion that some one ought always to be in attendance for such cases.

Curiosities of Leech Culture.—Many of those who have assiduously cultivated the leech have amassed handsome fortunes, the trade being very remunerative. A prosperous merchant, away in some far district of Poland or Wallachia, will keep some two or three hundred of the inhabitants of his district in full employment collecting for him, paying them on the best of all plans, according to their labour—viz., so much a dozen, according to the age and quality of the leeches which they bring to the depôt. The animals must be all gathered before the heat of the day sets in, and at once carried home to the capacious reservoirs provided for their reception, where they are at once counted and paid for. Packed in clay or in bags, they are at certain seasons dispatched by fleet conveyances to Marseilles, or direct to Paris, change of horses on the way being insured, when necessary, by liberal payments. The mode of packing the leeches for transport is much the same in most of the breeding districts. Some are placed in boxes—first a layer of moist white clay, then a layer of the little animals, and so on till the chest is full. Some of the merchants pack the leeches in bags as soon as they are taken out of the marshes. Each of these bags contains about sixteen pounds weight, and it is necessary that they should be hung up for a period till the water is all drained out of them, and then the animal rolls itself up into a kind of ball, and lies in a semi-torpid state till it is, perhaps, revived on its journey by a dip into some half-way pond. The boxes or bags containing the leeches are carried in light waggons divided into necessary compartments. Relays of horses and drivers are always kept in readiness at the various stages of the journey; but, notwithstanding the greatest care may be taken in their transport, immense numbers of the animals are killed. Severe frost or great heat is equally fatal to them.—*Once a Week.*

Bark of Pomegranate Root as a Remedy in Tapeworm.—An extract of the bark of Pomegranate root, prepared in the following manner, is recommended by Dr. Tilton, U.S.A., in the treatment of tapeworm:—Take Cort. Rad. Granati ʒij; Alcohol Oj; macerate for fourteen days, filter and evaporate the alcohol, leaving the water of the alcohol combined with the active principle of the bark. The resulting extract should measure from four to six ounces. One third of this quantity is given for a dose.—*Phil. Med. Surg. Rep.*, and *Dublin Medical Press.*

The Medicinal Use of Malt.—Malt, as a medicinal agent, has been in use in Germany in bronchitic and dyspeptic affections. It is stated that in the solution of malt, after one hour's maceration in water at 75° centigrade, gluten is found in a dissolved condition. Malt is also being used in the form of powder taken into the stomach, or added to warm baths. The remedy has been tried by M. Frémy, of Paris, who states that he considers it an excellent tonic.

REVIEW.

Sketches of the Natural History of Ceylon: with Narratives and Anecdotes illustrative of the Habits and Instincts of the Mammalia, Birds, Reptiles, Fishes, Insects, etc., including a Monograph of the Elephant, and a Description of the Modes of Capturing and Training it. With Engravings from Original Drawings. By Sir J. Emerson Tennent, K.C.S., LL.D., etc. Pp. 524. Longman and Co., 1861.

The learned author of the present volume states that "a considerable portion of its contents formed the zoological section of a much more comprehensive work, recently published, on the History and Present Condition of Ceylon.* In that work it was necessary to curtail the chapters treating of the zoological portion of the subject, and in order therefore to remedy this admitted defect in such particulars, the present volume has been issued.

The title of the work will give our readers a general notion of the subjects treated of; and to those who are desirous of perusing a volume, in which scientific accuracy, literary merits, and interesting anecdotes are combined, we most cordially recommend it. The following extracts will be of more direct interest to our readers:—

"Cetacea.—Whales are so frequently seen that they have been captured within sight of Colombo, and more than once their carcases, after having been flinched by the whalers, have floated on shore near the lighthouse, tainting the atmosphere within the fort by their rapid decomposition.

"Of this family, one of the most remarkable animals on the coast is the dugong, a phytophagous cetacean, numbers of which are attracted to the inlets, from the bay of Calpentyn to Adam's Bridge, by the still water and the abundance of marine algæ in these parts of the gulf. One which was killed at Manaar and sent to me to Colombo in 1847, measured upwards of seven feet in length; but specimens considerably larger have been taken at Calpentyn, and their flesh is represented as closely resembling veal.

"The rude approach to the human outline, observed in the shape of the head of this creature, and the attitude of the mother when suckling her young, clasping it to her breast with one flipper, while swimming with the other, holding the heads of both above water; and when disturbed, suddenly diving and displaying her fish-like tail,—these, together with her habitual demonstrations of strong maternal affection, probably gave rise to the fable of the 'mermaid;' and thus that earliest invention of mythical physiology may be traced to the Arab seamen and the Greeks, who had watched the movements of the dugong in the waters of Manaar."

"Pamboo-Kaloo, or Snake-stone.—The use of the Pamboo-Kaloo, or snake-stone, as a remedy in cases of wounds by venomous serpents, has probably been communicated to the Singhalese by the itinerant snake-charmers who resort to the island from the coast of Coromandel; and more than one well-authenticated instance of its successful application has been told to me by persons who have been eye-witnesses to what they described. On one occasion, in March, 1854, a friend of mine was riding with some other civil officers of the Government along a jungle path in the vicinity of Bintenne, where he saw one of two Tamils, who were approaching the party, suddenly dart into the forest and return, holding in both hands a cobra de capello, which he had seized by the head and tail. He called to his companion for assistance to place it in their covered basket, but, in doing this, he handled it so inexpertly that it seized him by the finger, and retained its hold for a few seconds, as if unable to retract its fangs. The blood flowed, and intense pain appeared to follow almost immediately; but, with all expedition, the friend of the sufferer undid his waistcloth, and took from it two snake-stones, each of the size of a

* Ceylon: an Account of the Island, Physical, Historical, and Topographical; with Notices of its Natural History, Antiquities, and Productions. By Sir James Emerson Tennent, K.C.S., LL.D., etc. Illustrated by Maps, Plans, and Drawings. 2 vols. 8vo. Longman and Co., 1859.

small almond, intensely black and highly polished, though of an extremely light substance. These he applied, one to each wound inflicted by the teeth of the serpent, to which they attached themselves closely; the blood that oozed from the bites being rapidly imbibed by the porous texture of the article applied. The stones adhered tenaciously for three or four minutes, the wounded man's companion in the meanwhile rubbing his arm downwards from the shoulder towards the fingers. At length the snake-stones dropped off of their own accord; the suffering of the man appeared to subside; he twisted his fingers till the joints cracked, and went on his way without concern. Whilst this had been going on, another Indian of the party who had come up took from his bag a small piece of white wood, which resembled a root, and passed it gently near the head of the cobra, which the latter immediately inclined close to the ground; he then lifted the snake without hesitation, and coiled it into a circle at the bottom of his basket. The root by which he professed to be enabled to perform this operation with safety he called the *Naya-thalic Kalanga* (the root of the snake-plant), protected by which he professed his ability to approach any reptile with impunity.

"In another instance, in 1853, Mr. Lavallière, then District Judge of Kandy, informed me that he saw a snake-charmer in the jungle, close by the town, search for a cobra de capello, and, after disturbing one in its retreat, the man tried to secure it, but, in the attempt, he was bitten in the thigh till blood trickled from the wound. He instantly applied the *Pamboo-Kaloo*, which adhered closely for about ten minutes, during which time he passed the root which he held in his hand backwards and forwards above the stone, till the latter dropped to the ground. He assured Mr. Lavallière that all danger was then past. That gentleman obtained from him the snake-stone he had relied on, and saw him repeatedly afterwards in perfect health.

"The substances used on both these occasions are now in my possession. The roots employed by the several parties are not identical. One appears to be a bit of a stem of an Aristolochia; the other is so dried as to render its identification difficult, but it resembles the quadrangular stem of a jungle vine. Some species of Aristolochia, such as the *A. serpentaria* of North America, are supposed to act as specifics in the cure of snake-bites; and the *A. indica* is the plant to which the ichneumon is popularly believed to resort as an antidote when bitten; but it is probable that the use of any particular plant by the snake-charmers is a pretence, or rather a delusion, the reptile being overpowered by the resolute action of the operator, and not by the influence of any secondary appliance. In other words, the confidence inspired by the supposed talisman enables its possessor to address himself fearlessly to his task, and thus to effect, by determination and will, what is popularly believed to be the result of charms and stupefaction. Still it is curious that, amongst the natives of Northern Africa, who lay hold of the *Cerastes* without fear or hesitation, impunity is ascribed to the use of a plant with the juice of which they anoint themselves before touching the reptile; and Bruce says of the people of Sennar, that they acquire exemption from the fatal consequences of the bite by chewing a particular root, and washing themselves with an infusion of certain plants. He adds that a portion of this root was given him, with a view to test its efficacy in his own person, but that he had not sufficient resolution to make the experiment.

"As to the snake-stone itself, I submitted one, the application of which I have been describing, to Mr. Faraday, who has communicated to me, as the result of his analysis, his belief that it is 'a piece of charred bone which has been filled with blood perhaps several times, and then carefully charred again. Evidence of this is afforded, as well by the apertures of cells or tubes on its surface as by the fact that it yields and breaks under pressure, and exhibits an organic structure within. When heated slightly, water rises from it and also a little ammonia; and, if heated still more highly in the air, carbon burns away, and a bulky white ash is left, retaining the shape and size of the stone.' This ash, as is evident from inspection, cannot have belonged to any vegetable substance, for it is almost entirely composed of phosphate of lime."

BOOKS RECEIVED.

The Art of Perfumery, and the Methods of Obtaining the Odours of Plants, etc. By G. W. Septimus Piesse. Third edition. London: Longman, Green, Longman, and Roberts. 8vo, pp. 396.

The Products and Resources of Tasmania, as illustrated in the International Exhibition, 1862; compiled by George Whiting, Secretary to the International Exhibition Commissioners for Tasmania. Hobart Town, Tasmania, 1862.

The Granulation of Medicines. By Thomas Skinner, M.D., Liverpool. (Reprinted from the 'British Medical Journal.')

The Stars and the Telescope; forming a Familiar Introduction to Astronomy. By J. T. Slugg. Second edition. Manchester: Ireland and Co. London: Simpkin, Marshall, and Co.

TO CORRESPONDENTS.

G. W. (Gravesend).—*Aquaria for the preservation of Leeches.* See Vol. XV., page 453.

S. B. (Salisbury).—The same qualifications are required of all candidates for the office of Dispenser under Government.

Medicus (Paisley).—*Parish's Compound Syrup of the Phosphates.* See Vol. XVIII. page 579.

E. H. T. (Droitwich).—*Silvering Solution.* Dissolve 2 oz. of Liebig's cyanide of potassium (see Vol. II. page 88) in a pint of distilled water; add ¼ oz. of moist oxide of silver (precipitated by lime-water from a solution of the nitrate), and agitate together till the oxide is dissolved.—*Beasley.* For other processes of silvering, see Vol. XVI. page 138 (Liebig's), and page 149 (Petitjean's) of this Journal.

M. P. S.—*Tincture of Sumbul*, Vol. XV. page 508. We know of no formula for *Essence of Sumbul.*

"*Ferrum Frigidum*" (Barking) wishes to know the nature of the poison referred to in the case of a man who a short time since died from the effects of a wound in the knuckles, which, it was alleged, had been poisoned by the teeth of the man whom he struck.

R. W. (Rugby).—(1) The price of a Dentist's operating chair is about £15. (2) Application by letter should be made to Dr. Gibson, Army Medical Department, Whitehall.

J. B. (Paris) wishes for information respecting an article called *Houshio.*

Delta (London).—*Liq. Ferri Peracet. Dub. Ph.* Sesquioxide of iron 1 part, acetic acid 6 parts; digest for three days and filter.

Q. S. (Doncaster).—*Writing Inks.* See Vol. XII., pages 65 and 134.

A Student should apply, stating name and address, to Professor Bentley.

S. B.—The Latin Pharmacopœia and Cæsar's Commentaries 'De Bello Gallico.'

A Reader (Leeds).—We know of no authorized formula for *Liquor Calcii Sulphureti.* A solution is sometimes made by boiling together one part of sublimed sulphur, two of lime, and ten of water.

A. (Richmond).—The matter referred to by your correspondent shall receive an early notice.

Instructions from Members and Associates respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editors, 17, Bloomsbury Square.

INDEX.

PAGE

Acari, Mr. Attfield's 580
Accidental Poisoning . . . 341, 535
——————— by Laudanum 46, 199
——————— Prevention of 106, 192
——————— Protection against 108
——————— by Tincture of Colchicum 45
Accidents from the Escape of Carbonic Acid Gas 340
Acetate of Lead, Attempt to Poison by 628
——————— Suicide by . . . 199
——— of Morphia, Death from One Grain of 45
Acid, Arsenious, Solubility of, in Glycerine 213
—— Carbolic, some Applications of, or Hydrate of Oxide of Phenyle (F. C. Calvert) 319
——————— some Coloured Reactions of (M. Monnet) 483
—— Carbonic, Solidification of . 121
—— Chlorsulphuric 382
—— Nitrous, Action of on Salts of the Suboxide of Copper . . , . 214
—— Perchloric, and its Hydrates (Prof. Roscoe) 284
—— Phosphoric, Common, conversion of Monohydrated into (J. M. Maisch) 278
—— Prussic, Poisoning by . . . 390
——————— Suicides by . 200, 581
—— Sulphuric, free from Arsenic, preparation of 606
—— Sulphurous, Detection of . . 327
—— Tannic in Galls, Process for Estimating (J. H. Marriage) . . 509
——————— New Method of Estimating (M. K. Hammer) . . . 433
Aconite, Poisoning by 193
—— Tincture of, Accidental Poisoning by 199
——————— Large Dose of (J. W. Kay) 243
Address of Condolence to Her Majesty 396

PAGE

Adjourned Meeting of the Pharmaceutical Society:
Election of Council, etc. . . . 601
Adulteration of Black Hellebore with Banc-Berry (R. Bentley) . 109
——————— of Tinfoil 440
——————— (J. H. Baldock) 378
Aërolites 184
——— (J. T. Slugg) 225
Air, Rarefied, Phenomena Attending Combustion in (E. Frankland) . 24
Alizarin, Production of from Naphthalin 16
Alkali Manufacture, History of (Mr. Gossage) 281
Alleged Neglect in Supplying Medicines (Dungay *v.* Quiller) . . . 625
Alloxan Found by Dialysis in an Animal Secretion (Baron Liebig) . . 528
Almond, Bitter, and Cherry Laurel Distilled Waters (M. Mayet) . . 161
Aloes, Constitution of 268
Althaus, J., Lithia Springs of Baden Baden 577
Alumina, Sulphate of and Zinc, Local Employment of 246
Amended Bye-Laws of the Pharmaceutical Society, Proposed . 346, 349
American Remedies, New (R. Bentley) 456, 540
Ammonia and Atmospheric Air, Action of, on Metallic Copper . . 159
Anacahuite Wood (B. Seemann) . 164
Anæsthetic, Turpentine as an . 32
——————— New, Kerosolene (E. Cutter) 216
——————— Local (M. Fournié) 385
Analysis, Liquid Diffusion applied to (T. Graham) 118
——————— Spectrum (Dr. W. A. Miller) 397
——————— Apparatus for (A. Waugh) 426
Anarcotine 435

PAGE
Aniline, Sulphate of, Properties of (Dr. Turnbull) 284
Anniversary, 21st of the Pharmaceutieal Society:
President's Speech 591
Report of the Council and Finaneial Statement 593
Another Point in Question (A. F. Haselden) 266
Antagonistie Effects of Opium and Quinine (Dr. Nivison) 277
Anthelmintics of Abyssinia (Dr. Courbon) 20
Anti-Granulation (A. F. Haselden) . 603
Appointment of Local Secretaries . 490
Arsenic, Alleged Poisoning by . . 243
——— Attempted Poisoning by . 198
——— Poisoning by . . . 342, 390
——— Sulphide of in Commercial Sulphide of Antimony (R. Reynolds) 568
Arsenical Mucilage in the Treatment of Cancer 582
——— Toys 198
Arsenious Acid, Solubility of in Glycerine 213
——— a Substitute for Quinine (J. Turner) 166
Artificial Flowers, Poisoning by . . 391
——— Production of Ice . . . 121
Asparagin, Preparation of 572
Asphodel, Commercial Produets of (Sir W. J. Hooker) 24
Associates and Apprentices, Lists of 4, 107, 157, 251, 299, 349, 397, 444, 539
Attempted Poisoning in Ceylon . . 343
Atropine, Poisoning by 583
Attfield, Mr., Acari 580
———J., Casella's New Mercurial Minimum Thermometer 264
——— Mineral Constituents of Plants 447
——— Nutritive Value of Dika Bread 445
———Poisons not always Poisons 453
Axtramankaz 150

Baldock, J. H., Adulteration of Tinfoil 378
Banner, S., on Pill Coverings and on the Preparation of a New Form of Medieine, Granular Powders . . 374
Bark of Pomegranate Root as a Remedy for Tapeworm 629
Barometer, New Form of 529
——— Water 218
Bary, Dr. A. De, Cause and Treatment of the Potato Disease . . . 285

PAGE
Baryta, Hydrate of, Preparation of 18
Beans, Mazagan, Death from Swallowing 291
Beetroot Spirit, Distillation of, in this Country 183
Bell, Jacob, Memorial Fund . . . 349
——— Subscriptions to 157, 251, 444
——— Memorial Scholarships 105, 155
——— Names of the Suceessful Candidates for . 253
——— Resolution of Council respecting . . . 107
Benevolent Fund 586
———Subscribers to, 1861 492
Bentley, R., Adulteration of Black Hellebore with Banc-Berry . . 109
——— New American Remedies 456, 540
——— Plants in a State of Life or Action, and their Influence in Nature, Lecture on 464
——— Remarks on the Professional Education of Medieal and Pharmaceutical Students . . . 333
——— Presentation of a Testimonial to 603
Berberine, Occurrence of, in Xanthorrhiza apiifolia (J. D. Perrins) . . 567
Bernatzik, W., Adulteration of Musk and Methods of Examining the same 275
Berries of Solanum Pseudo-Capsieum, Poisoning by (M. Montané) 163
Berthelot, M., on the Manna of Sinai and the Manna of Syria 274
Bitter Almond and Cherry Laurel, Distilled Waters (M. Mayet) . . 161
Bismuth, Detection of in Presence of Copper 530
Black Hellebore, Adulteration of with Bane-Berry (R. Bentley) . . 109
Blood, Action of Chloroform on . . 339
Blunders in Pharmaceutical Directions 335
Borate of Lime and Soda from Peru (T. L. Phipson) 217
Botanieal Prize for 1863 493
Botanist, Medical, Charge of Manslaughter against 149
Botany and Materia Medica, Questions for Examination in . . . 255
Bread, Dika, Nutritive Value of (J. Attfield) 445
Brighton Chemists' Association: Annual Meeting, etc. 602

PAGE

British Association, Thirty-first Meeting of:
——— President's Address 228
——— List of Committee 241
——— List of Papers read at Meetings 241
British Pharmacopœia 242
——— Report on (A. B. Garrod) 128
Brodie, Sir B., Letter on Homœopathy 225
Bust of the late Jacob Bell . . . 253
Bye-Laws of the Pharmaceutical Society, Proposed Alterations in . 108
——— Proposed Amended 346
——— and the Existing 349
——— the New 490
——— Special General Meeting for the Confirmation of 397, 550
Bye-Laws and Progression . . . 1, 106
———, Question of 153

Caffeine, etc., Chemical Relations of 268
Calvert, F. Crace, Action of Water on Lead 283
——— Cotton Oil Cake . 485
——— Some Applications of Carbolic Acid, or Hydrate of Oxide of Phenyle 319
Cancer, Arsenical Mucilage in the Treatment of 582
Cantharides, Unlawful Administration of 194
Carbolic Acid, Some Applications of (F. C. Calvert) 319
——— Some Coloured Reactions of (M. Monnet) 483
Carbonate of Soda, Manufacture of (A. N. Tate) 561
Carbonic Acid, Solidification of . . 121
——— Gas, Accidents from the Escape of 340
——— Deaths from . 485
——— Oxide, Poisonous Effects of (H. Letheby) 531
Carbonized Rye as a Tooth Powder 340
Casella's New Mercurial Minimum Thermometer (J. Attfield) . . 264
Cæsium and Rubidium 270
Castor Oil in the Volatile Oils, Means of Detecting the Presence of (H. N. Draper) 27
Castor, Norwegian 165

PAGE

Castorin, Preparation of (M. Valenciennes, Jun.) 329
Caution to Chemists 392
Certified Prescription Copies, a Fee for (W. J. Halliday) 223
Chalybeate, a New Form of . . . 150
Chamomile, Essential Oil of . . . 429
Chemical Combinations, Action of Porous Bodies in inducing . . 325
——— Nature of the Silkworm's Skin 121
——— Relations of Guanine, Zanthine, Theobromine, and Caffeine 268
Chemist, Pharmaceutical, Title of (Pharmaceutical Society *v.* Mikisch) 192
Chemist's Assistant, Charge of Manslaughter against 535
Chemists, Right of to Prescribe 224, 297
Chemistry and Pharmacy, Questions for Examinations in 254
——— Solar, Physical Basis of (J. Tyndall) 131
Cherry Laurel and Bitter Almond, Distilled Waters (M. Mayet) . . 161
Chicory, the Quantity Produced, and the Duty Charged on it 183
Chemical Composition of Magenta . 570
Chinese Materia Medica, Notes on (D. Hanbury) . 6, 204, 260, 315, 420
Chlorate of Potash for Fœtid Breath 246
Chloric Ether, Composition of (A. N. Tate) 533
Chloride and Bromide of Cyanogen, Production of 326
——— of Lime, Commercial, Action of Water, etc. (M. Frescnius) . 383
Chlorodyne, Formulæ for 584
Chloroform, Deaths from 247, 342, 343, 436
——— Action of on the Blood 339
——— Local Application of . 299
——— Internal Administration of 149
——— Preparation of . . . 123
——— Syrup of 45
Chloroformic Solution of Gutta-Percha 44
Chlorophyll 392
Chlorsulphuric Acid 382
Cinchona Plant, Introduction of into India (C. R. Markham) . . . 611
——— in India 217
Cinchonine, Certain Reactions of (M. H. Kœchlin) 385
Cleave, S. W., Eclectic Pharmacy . 320
Cloves, Formation of Fatty Matter in 339
Coal Tar, Colouring Matters derived from 166
——— Emulsion 152

PAGE
Coating Pills (B. S. Proctor) . . . 562
Cochineal, Liquid 584
Colchicum, Saccharate of 150
——— Tincture of, Accidental Poisoning by 45
Collodions, Vesicating (C. R. C. Tichborne) 506
Colour Tests for Strychnia, and the Diagnosis of the Alkaloids (W. A. Guy) 11, 112
Colours, Primary, Theory of (J. B. Kearney) 210
———————Three, Theory of (J. Clark Maxwell) 179
Colouring Matter derived from Coal Tar 166
Colza Oil, Detection of, when Mixed with other Oils (M. Schneider) . 484
Comparative Weight of Drops of various Fluids. 435
Constitution of Aloes 268
Conversazione 589
Cooke, M. C., Pine Wool 29
Copper in Fine Powder, Reduction of 159
——— Metallic, Action of Ammonia and Atmospheric Air on . . 159
Corks, Safety Poison 478
Correspondence relating to the Progress of the Pharmaceutical Society, 33, 137, 186, 220
Correspondents, Answers to 46, 152, 200, 248, 296, 344, 392, 440, 488, 536, 584, 632
Corrosive Sublimate, Attempts to Poison by 627
Cosmetics, French 44
Cotton Seed Oil, N. H. Weatherly 30
———— Oil Cake, F. C. Calvert 485
Council, General, of Medical Education and Registration 608
Council of the Pharmaceutical Society, Meetings of:
Address of Condolence to Her Majesty 396
Appointment of Committees . . 4
———————— Local Secretaries 108
Election of Members, &c., 107, 157, 251, 299, 348, 396, 443, 493, 539, 389
Election of Officers 4
Proposed Alteration of the Bye-Laws 108
Protection against Accidental Poisoning 108
Resolution respecting the Jacob Bell Memorial Scholarship . . 107
Council of the Pharmaceutical Society, Special Meetings of, 348, 443

PAGE
Council of the Pharmaceutical Society, Election of Members of 443
———————————— for 1862-63 601
Courbon, Dr., on the Tœnifuges (Anthelmintics) of Abyssinia . . 20
Crystallized Manganate of Soda . 326
Curiosities of Leech Culture . . . 629
Cutter, E., the New Anæsthetic Kerosoline 216
Cuttle Fish, Habits of 184
Cyanide of Potassium, Poisoning by. 294, 342
Cyanogen, Chloride and Bromide of, production of 346

Dalleochine or Quinine Green . . 291
Daniell, W. F., Ricinus inermis . . 15
Death, Alleged, from Poison . . . 436
——— from Burning by Sulphuric Acid 291
———— Mazagan Beans . . . 291
———— One Grain of Acetate of Morphia 45
———— Opium 151
———— Sulphurous Acid Fumes 291
Deaths from Carbonic Acid Gas . . 485
———— Chloroform . 247, 342, 343, 436
Decomposition of the Resin of Guaiacum, Products of (MM. Hlasiwetz and de Gilm) 483
Dental System of Man and the Lower Animals (J. Smith) 514
Deep Well at Brighton 621
Diabetes, New Test for 150
Dialysis, Alloxan found by, in an Animal Secretion (Baron Liebig) . . 528
———, or Liquid Diffusion, Lecture on (T. Redwood) 515
Digitaline 245
Dika Bread, Nutritive Value of . . 445
Directions, Pharmaceutical, Blunders in 335
Diseased Grapes, Poisoning from . 386
Dispenser in the Army, Qualification for Appointment as 437
Dissecting Leaves, Mode of . . . 182
Distillation of Beetroot Spirit in this Country 183
Donations to the Library and Museum of the Pharmaceutical Society . . . 252, 299, 367, 444, 510
Donovan, Mr., Inefficiency of Henbane as Usually Prescribed . . . 618
Draper, H. N., Improved Method of Preparing Sodæ Carbonas Siccata. 129
———————, Podophyllin . . . 331

PAGE

Draper, H. N., Means of Detecting the Presence of Castor Oil in the Volatile Oils 27
Drosera, Physiological and Therapeutical Effects of 339
Druggists' Festival at Glasgow . . 338
————, Prescribing by (Huggins *v.* Jonas). 147
Drugs, Sale of, by Grocers 147

Eclectic Pharmacy (S. W. Cleave) . 320
Edinburgh Pharmaceutical Society, Meetings of . 308, 413, 478, 514, 550
See also Pharmaceutical Society, Edinburgh, Meetings of.
Edinburgh School of Chemistry and its Teachers, Historical Remarks on (M. Thomson) 550
Education, Professional, of Medical and other Students, Remarks on (R. Bentley) 333
Election of Council 443
———————— for 1862-63 . . 601
Electric Light, Formation of the Green Matter of Leaves under the Influence of. 212
Emplastrum Resinæ. 583
Errata, 152, 248, 251, 299, 396, 440, 536
Escharotic for Toothache 197
Essential Oil of Chamomile . . . 429
———————— Ledum (MM. Kromayer and Frochde) 579
Ether, Chloric, Composition of (A. N. Tate) 533
——— Employed in the Form of Affusion in Neuralgia 45
———, Oxalic, Preparation of (MM. Toussaint and Kalle) 580
Etna-tree, Observations on . . . 182
Examination, Major, Candidates who have passed, 107, 157, 251, 396, 443, 539
————————, Minor, Candidates who have passed, 107, 157, 251, 299, 397, 443, 539
Exhibition, International, of 1862, Representation of Pharmacy at . 154
Explosion of Paraffin . . 195, 388, 434
Extracts, Medicinal, from the Fresh Plants (G. B. Francis) 377
————, Preparation of (T. B. Groves) 375

Fabrics, Non-Inflammable . . 197, 340
Faraday, Prof., Platinum 28
Fatty Matter in Cloves, Formation of 339
Fermentation, Effects of Filtering Air in Preventing 324

PAGE

Ferri Ammonio-Phosphas (W. Wilkinson) 425
—— Carbonas Effervescens . 150, 290
Festival, Druggists' at Glasgow . . 338
Filtering the Air, Effect of in Preventing Fermentation, Putrefaction, and Crystallization 324
Financial Statement of the Pharmaceutical Society for 1861 . . . 593
Fish, Cuttle, Habits of 184
Fluids, Various, Comparative Weight of Drops of 435
Formation of the Green Matter of Leaves under the Influence of the Electric Light 212
Formulæ, New, for Sinapisms . . 246
Francis, G. B., Medicinal Extracts from Fresh Plants 377
Frankland, E., some Phenomena attending Combustion in Rarefied Air. 24
Freezing and Boiling Points of Water 211
French Cosmetics 44
Fresenius, M., Action of Water on Commercial Chloride of Lime . . 383
Fruits, Green or Unripe, Starch of, (M. Payen) 386
Fumes, Nitrous, Poisoning by . . 435
——— of Sulphurous Acid, Death from 291
Fund, Benevolent 586
————————, Subscribers to . 492
———, Jacob Bell Memorial . . . 349
————————————, Subscriptions to 157, 251, 444
———, Pereira Memorial 156
Fungi, Poisoning by in France . . 289
Furley, Mr., Process for Rendering Pills Tasteless 300

Galbanum, Researches on 428
Galena, Extraction of Silver from . 18
Galls, Tannic Acid in, Process for Estimating (J. H. Marriage) . . 509
Gamgee, J., Influence of the Study of Comparative Therapeutics on the Progress of Pharmacy 413
Garrod, A. B., Report on the British Pharmacopœia 128
Gas, Carbonic Acid, Deaths from . 485
—— Evolved from Leaves during the Decomposition of Carbonic Acid, Nature of 479
General Council of Medical Education and Registration 608
Ginseng 332
———, Root of 197

PAGE

Glycerine, Solubility of Arsenious Acid in 213
Glycerole 246
Graham, T., Liquid Diffusion Applied to Analysis 118
Granular Powders, Preparation of (S. Banner) 374
Granulation of Medicines (T. Skinner) 572
Grapes, Diseased, Poisoning from . 386
Green, Kendal 246
——— Matter of Leaves, Formation of under the Influence of the Electric Light 212
——— or Unripe Fruits, Starch of (M. Payen) 386
Gossage, Mr., History of Alkali Manufacture 281
Gout, Treatment of by Guaco (E. W. Pritchard) 288
Groves, T. B., Preparation of Extracts 375
Guaco, Treatment of Gout by (E. W. Pritchard) 288
Guaiacum, Resin of, Products of Decomposition of (MM. Hlasiwetz and de Gilm) 483
Guanine, etc., Chemical Relations of. 268
Guano, Fertilizing Power of . . . 324
Gunpowder, White 122, 245
Gutta-Percha, Chloroformic Solution of 44
Guy, W. A., Colour Tests for Strychnia, and Diagnosis of the Alkaloids 11, 112

Halliday, W. J., a Fee for Certified Prescription Copies 223
————————, Pharmaceutical Dispensing Price-mark 338
Hammer, M. K., New Method of Estimating Tannic Acid 433
Hanbury, D., Notes on Chinese Materia Medica, 6, 204, 260, 315, 420
Haselden, A. F., Another Point in Question 266
————————, Anti-Granulation . 603
Hellebore, Black, Adulteration of with Bane-Berry (R. Bentley) . 109
Henbane, Inefficiency of, as usually Prescribed (M. Donovan) . . . 618
————, its Preparations and Doses (B. S. Proctor) 510
Herbaria, Prizes for 256
Hlasiwetz and de Gilm, Products of Decomposition of the Resin of Guaiacum 483

PAGE

Homœopathy, Letter on (Sir B Brodie) 225
Hooker, Sir W. J., Commercial Products of the Asphodel 24
Hooping-cough, Trifolium in Fœno, a Remedy for 32
Hydrastine, an Alkaloid Occurring in Hydrastis canadensis (J. D. Perrins) 546
Hydrastis canadensis (R. Bentley) . 540
Hydrate of Baryta, Preparation of . 18
Hypophosphite of Lime, Researches on (M. G. Jaussen) 327

Ice, Artificial Production of . . . 121
Internal Administration of Chloroform 149
International Exhibition of 1862 . 345
———————————— Representation of Pharmacy at . . 154, 249, 538
Iodate and Iodide of Sodium, Compound of (M. Rammelsberg) . . 579
Iodide of Potassium, Action of Permanganate of Potash on 608
————————————, Preparation of (W. S. Squire) 548
Iron or Copper Pyrites, Estimation of Sulphur in 427
——, Oleaginous Matter Formed on Dissolving in Dilute Acids (E. J. Reynolds) 162
——, Perchloride of, Preparation of. 122
—— and Steel, Varnish to Prevent Rust in 197

Jaussen, M. G., Researches on Hypophosphite of Lime 327

Kay, J. W., Large Dose of Tincture of Aconite 243
Kearney, J. B., Theory of Primary Colours 210
Keffer, M., Preservation of Red Precipitate Ointment 329
Kelp, Manufacture of (E. C. C. Stanford) 495
Kendal Green 246
Kerosolene, a New Anæsthetic (E. Cutter) 216
Kittool Fibre, Notes on 280
Kœchlin, M. H., Certain Reactions of Cinchonine 385
Kromayer and Frochde, MM., Preparation of Menyanthine, and on the Essential Oil of Ledum . . 579

Laudanum, Attempted Poisonings by 628

PAGE

Laudanum, Attempted Suicides by, 151, 436
————, Poisoning by, 46, 151, 199, 341, 342
————, Suicides by . 199, 289, 628
Leaders :—
Progression and the Bye-Laws . . 1
The Jacob Bell Memorial Scholarships 105
Progression and the Bye-Laws . . 106
The Prevention of Accidental Poisoning 106
The Question of the Bye-Laws . 153
The Representation of Pharmacy at the International Exhibition of 1862 154
The Jacob Bell Memorial Scholarships 155
The Pereira Memorial Fund . . 156
The Difficulty.—Is it Past or Prospective? 201
Licence for the Use of Stills or Retorts 202
The Representation of Pharmacy at the International Exhibition of 1862 249
The Right of Chemists and Druggists to Prescribe 297
The International Exhibition of 1862 345
The Proposed Amended Bye-Laws of the Pharmaceutical Society 346
Authority of the Pharmacopœia . 393
The Improper Introduction and Designation of New Medicines . 394
International Exhibition of 1862: Exhibition of Drugs and Pharmaceutical Preparations . . . 441
Pharmaceutical Responsibility *v.* Free Trade in Physic 489
Appointment of Local Secretaries 490
The New Bye-Laws 490
Qualification for Appointment as Dispenser in the Army . . . 537
Pharmacy at the International Exhibition 538, 585
The Benevolent Fund 586
Lead, Acetate of, Attempted Poisoning by 628
————, Suicide by . . . 199
——, Action of Water on (F. C. Calvert) 283
Leaves, Green Matter of, Formation of under the Influence of the Electric Light 212
———, Mode of Dissecting . . . 182

PAGE

Leaves, Nature of the Gas Evolved from during the Decomposition of Carbonic Acid 479
Leech Culture, Curiosities of . . . 629
Letheby, H., Poisonous Effects of Carbonic Oxide 531
Letter from Mr. Vizer 43
Library of the Pharmaceutical Society, Donations to:
See Donations to the Pharmaceutical Society.
Licence for the Sale of Methylated Spirit 183
———— Use of Stills or Retorts 202
Liebig, Baron, Alloxan found by Dialysis in an Animal Exeretion 528
Light, Deleterious Effects of, on Potatoes 287
Lime, Chloride of, Action of Water on (M. Fresenius) 383
——, Hypophosphite of, Researches on (M. G. Jaussen) 327
—— and Soda, Borate of from Peru (T. L. Phipson) 217
Liquid Cochineal 584
——— Diffusion Applied to Analysis (T. Graham) 118
Liquorice, Trade in (P. L. Simmonds) 623
List of Members, etc., 1861 . . . 47
————, Associates and Apprentices, 4, 107, 157, 251, 299, 348, 396, 443, 493, 539, 589
——— Pupils who have Free Admission to the Royal Botanic Gardens 494
Lithia Springs of Baden Baden (J. Althaus) 577
Liverpool Chemists' Association, Meetings of:—
Anacahuite Wood, Remarks on (Mr. Evans) 5
Annual Meeting, Report, etc. . . 257
Award of Laboratory Prize . . . 5
Chemistry of Ventilation, Notice of Lecture on (H. S. Evans) . 5
Conversazione 419
Donations to the Library and Museum, 5, 6, 372, 373, 374, 419, 559
Election of Members, 5, 372, 373, 374, 479
Formation of a Class for the Study of Botany 6
Invention for the Prevention of Accidental Poisoning 373
Lectures Delivered 479

PAGE

Liverpool Chemists' Association, Meetings of:—
Manufacture of Carbonate of Soda (A. N. Tate) 561
On the Prevention of Poisoning by Accident, Paper on (Mr. Redford) 373
On Pill Coverings and Preparation of a New Form of Medicine, Granular Powders (S. Banner) . 374
Paper on "The Chemistry of Vegetation" 5
Soda and other Chemical Manufactures of Spain (T. Sherlock) . 560
Ventilation, Discussion on . . . 6
Volumetrical Analysis, Notice of Paper on (Mr. W. Whitthread) 6
Local Anæsthetic, a New (M. Fournié) 385
—— Secretaries, Appointment of 108, 490

Macadam, S., Spectrum Analysis, Lecture on 478
Magenta, Chemical Composition of . 570
Maisch, J. M., Conversion of Monohydrated into Common Phosphoric Acid 278
Major Examinations, Candidates who have Passed, 107, 157, 251, 299, 348, 396, 443, 539
———— in Edinburgh, Candidates who have Passed . . 397
Malt, Medicinal Use of 629
Manchester, Pharmacy in 41
Manganate of Soda, Crystallized . . 326
Manna of Sinai and the Manna of Syria (M. Berthelot) 274
Manslaughter, Charge of Against a Chemists' Assistant 535
Manufacture of Kelp (E. C. C. Stanford) 495
Markham, C. R., Introduction of the Cinchona Plant into India . . . 611
Marriage, J. H., Process for Estimating Tannic Acid in Galls . . . 509
Materia Medica, Chinese, Notes on (D. Hanbury), 6, 204, 260, 315, 420
Mazagan Beans, Death from Swallowing 291
Maxwell, J., C., Theory of the Three Primary Colours 179
Mayet, M., Bitter Almond and Cherry Laurel Distilled Waters 161
Medical Botanist, Charge of Manslaughter against 149
—— Education and Registration, General Council of 608

PAGE

Medicinal Extracts from the Fresh Plants (G. B. Francis) 377
————————, taking Belladonna as an Example (P. Squire) . 300, 368
———— Plants, Influence of Cultivation on 430
————————, Use of 629
Medicines, Alleged Neglect in Supplying:—
(Dungay *v.* Quiller) 625
————, Granulation of (T. Skinner) 572
————, Mistake in Labelling . 294
————, New, Improper Introduction and Designation of 394
————, Supply of to Charitable Institutions:—
(Luckombe and Another *v.* Ashton and Another) 534
Meeting, Anniversary, of the Pharmaceutical Society 591
————, Annual, of the Brighton Chemists' Association 602
———— of the Brighton Chemists' Association 109
———— of the British Association, *see* British Association.
Meetings, Council, of the Pharmaceutical Society, 4, 107, 157, 251, 299, 348, 396, 443, 493, 589
See also Council Meetings, etc.
Meetings of the Liverpool Chemists' Association, 5, 257, 372, 419, 479, 559
See also Liverpool Chemists' Association, etc.
Meetings, Pharmaceutical, Edinburgh . . . 308, 413, 478, 514, 550
See also Pharmaceutical Meetings Edinburgh.
Meetings, Pharmaceutical, London 252, 299, 367, 444, 494, 540
See also Pharmaceutical Meetings, etc.
Meetings, Special General, for the Confirmation of the Bye-Laws 397, 550
Members, etc., List of, 1861 . . . 47
Members, Associates, and Apprentices, List of 4, 107, 157, 251, 299, 348, 396, 443, 493, 539, 580
Memorial Fund, Jacob Bell, Subscriptions to 349
Menyanthine, Preparation of, and on the Essential Oil of Ledum (MM. Kromayer and Froehde) . . . 579
Mercurial Minimum Thermometer, Casella's New (J. Attfield) . . . 264
———————— W. Symons 323

PAGE

Mercury, Estimation of 17
Metallic Copper, Action of Ammonia and Atmospheric Air on . . . 159
Meteoric Stones 44
Methylated Spirit, Licence for the Sale of 183
——————— for Tinctures, Correspondence relating to . . . 486
Miller, Dr. W. A., Spectrum Analysis 397
Mineral Constituents of Plants (J. Attfield) 447
Minor Examination, Candidates who have passed . 107, 157, 251, 299, 348, 397, 443, 539
Miscellanea :—
Accidental Poisoning . . 341, 535
——————— by Cyanide of Potassium 294
——————— Laudanum 46, 199, 342
——————— Tincture of Aconite 199
——————— Colchicum 45
Accidents from the Escape of Carbonic Acid Gas 340
Action of Chloroform on the Blood 339
Alleged Poisoning by Phosphorus 293
——— Death from Poison . . 436
Arsenical Toys 198
——— Mucilage in the Treatment of Cancer 582
Anarcotine 435
Attempt to Administer Poison . 390
——— Poison by Acetate of Lead 628
——————— Corrosive Sublimate 627
———————Laudanum 627
Attempted Poisoning by Arsenic . 198
——————— in Ceylon . 343
——— Suicides 199
——————— by Laudanum 151, 436
Axtramankaz 150
Bark of Pomegranate Root as a Remedy in Tapeworm . . . 629
Carbonized Rye as a Tooth Powder 340
Charge of Administering Poison . 437
——— Manslaughter against a Chemist's Assistant 535
Chlorate of Potash for Fœtid Breath 246
Chloroformic Solution of Gutta Percha 44
Comparative Weight of Drops of Various Fluids 435

PAGE

Miscellanea :—
Condition of the Water Supplied by the City Pumps 197
Curiosities of Leech Culture . . 628
Dallcochine, or Quinine Green . 291
Death from Burning by Sulphuric Acid 291
——— One Grain of Acetate of Morphia 45
——— Sulphurous Acid Fumes 291
Swallowing Mazagan Beans . . 291
Deaths from Chloroform 247, 342, 436
——— Opium . . . 151, 627
Digitaline 245
Emplastrum Resinæ 583
Escharotic for Toothache . . . 197
Ether Employed in the Form of Affusion in Neuralgia 45
Explosion of Paraffin . . 388, 434
Ferri Carbonas Effervescens 150, 290
French Cosmetics 44
Formation of Fatty Matter in Olives 339
Glycerine 246
Internal Administration of Chloroform 149
Kendal Green 246
Local Application of Chloroform 290
—— Employment of Sulphate of Alumina and Zinc 246
Medicinal Use of Malt 629
Meteoric Stones 44
Mistake in Labelling Medicine . 294
New Formulæ for Sinapisms . . 246
—— Test for Diabetes 150
Non-Inflammable Fabrics . 197, 340
Nothing like Leather 340
Oil Springs of America and Canada 435
Opening of a Palm-Spathe with an Audible Report 196
Patented Ointment, a 340
Physiological and Therapeutical Effects of Drosera 339
Poison of the Toad 291
Poisoning by Arsenic . . . 342, 390
——— Artificial Flowers . 391
——— Atropine 583
——— Cyanide of Potassium 342
——— Laudanum . . 151, 341
——— Mistake . . . 294, 627
——— Nitrous Fumes . . 435
——— Noxious Animals . . 291
——— Opium 292
——— Phosphorous Paste . 292
Poisoning by Prussic Acid . . . 390
——— Strychnine . . . 293

PAGE

Miscellanea :—
Quackery 340
Root of Ginseng 197
Rugby Water Supply 583
Saccharate of Colchicum . . . 150
Scientific Nomenclature 435
Suicide by Acetate of Lead . . . 199
——— Cyanide of Potassium . 342
——— Laudanum . . . 199, 627
——— Prussic Acid . . 200, 581
Suspected Poisonings 626
Syrup of Chloroform 45
——— Santonine 45
Triticum repens 339
Varnish to Prevent Rust in Iron and Steel 197
White Gunpowder 245
Working a Patent for Purifying Paraffin 389
Monnet, M., Coloured Reactions of Phenol (Carbolic Acid) 483
Monohydrated Phosphoric Acid, Conversion of into Common (J. M. Maisch) 278
Montané, M., Cases of Poisoning by the Berries of Solanum Pseudo-Capsicum 163
Mordants in Dyeing, New Material for Thickening (M. Schwartz) . . 580
Morphia, Acetate of, Death from One Grain of 45
Museum of the Pharmaceutical Society, Donations to :
See Donations, etc.
Musk, Adulteration of, and Methods of Examining the Same (W. Bernatzik) 275

Naphthalin, Production of Alizarin from 16
Negative Impressions of Leaves, Ferns, etc. 248
Nitre, Valuation of 213
Nitrous Acid, Action of, on Salts of the Suboxide of Copper 214
——— Fumes, Poisoning by . . . 435
Nivison, Dr., Antagonistic Effects of Opium and Quinine 277
Nomenclature, Scientific . . 335, 435
Non-Inflammable Fabrics . . 197, 340
Norwegian Castor 165
Notes on Chinese Materia Medica (D. Hanbury) . 6, 204, 260, 315, 420
Nothing like Leather 340
Noxious Animals, Poisoning . . . 291

Obituary :—
Prof. Quekett 247

PAGE

Oil Cake, Cotton (F. C. Calvert) . . 485
—— Castor, Means of Detecting the Presence of in Volatile Oils (H. N. Draper) 27
—— of Chamomile, Essential . . . 439
—— Colza, Detection of, when Mixed with other Oils (M. Sehneider) 484
—— of Ledum, Essential (MM. Kromayer and Froehde) 579
——, Paraffin, Explosion of . . . 195
—— of Sesamum, and its Employment in Pharmacy (M. Roth) . . 164
——Springs of America and Canada 435
Ointment, Patented 340
——— Red Precipitate, Preservation of 329
Oleaginous Matter formed on Dissolving different kinds of Iron in dilute Acid (E. J. Reynolds) . . 162
Oleum Gossypii (Cotton Seed Oil) (W. H. Weatherly) 30
Opium, Deaths from . . 151, 292, 627
——— and Quinine, Antagonistic Effects of (Dr. Nivison) 277
Oxalic Ether, Preparation of (Toussaint and Kalle) 580

Palm Spathe, Opening of, with an Audible Report 196
Paraffin, Explosion of . . 195, 388, 434
——— Working a Patent for Purifying 389
Paraguay, Useful Plants of (D. Parodi) 18, 214, 272
Patented Ointment 340
Payen, M., Starch of Unripe or Green Fruits 386
Perchloric Acid and its Hydrates (Prof. Roscoe) 284
Perchloride of Iron, Preparation of . 122
Pereira Memorial Fund 156
Permanganate of Potash, Action of on Iodide of Potassium 608
Perrins, J. D., Hydrastine, an Alkaloid occurring in Hydrastis Canadensis 546
——————— Occurrence of Berberine in Xanthorrhiza Apiifolia . 567
Pharmaceutical Chemist, Title of (Pharmaceutical Society *v.* Mikiseh) 192
Pharmaceutical Directions, Blunders in 335
——————— Dispensing Price Mark (W. J. Halliday) 338
——————— and Medical Students, Professional Education of, Remarks on (R. Bentley) . . . 333

PAGE

Pharmaceutical Responsibility, *v.* Free Trade in Physic 489
Pharmaceutical Society, Edinburgh, Meetings of:—
Address of the President . . . 308
Annual Meeting and Valedictory Address 555
——— Supper 559
Dental System of Man and the Lower Animals (Dr. J. Smith) . 514
Historical Remarks on the Edinburgh School of Chemistry and its Teachers (Dr. M. Thomson) 550
Influence of the Study of Comparative Therapeutics on the Progress of Pharmacy (J. Gamgee) 413
Notice of a Lecture on Spectrum Analysis (S. Macadam) . . . 478
Report and Financial Statement . 557
Safety Poison Corks 478
Pharmaceutical Society, London, Meetings of:—
Donations to the Library and Museum . 252, 299, 367, 444, 540
Remarks on an Original Packet of James's Powder 252
Bust of the late Jacob Bell . . . 253
Jacob Bell Memorial Scholarships, Award of 253
Distribution of Prizes 254
Questions for Examination in Chemistry and Pharmacy . . 254
——— Botany and Materia Medica 255
Prizes for Herbaria 256
Award of Prizes for Herbaria . . 300
Remarks on Ordeal Root 300
Medicinal Extracts, taking Belladonna as an Example (P. Squire) 300
Discussion on the above 300
Process for Rendering Pills Tasteless (Mr. Furley) 308
Medicinal Extracts, taking Belladonna as an Example (P. Squire) 368
Nutritive Value of Dika Bread (J. Attfield) 445
Mineral Constituents of Plants (J. Attfield) 447
Discussion on the above 452
Poisons not Always Poisons (J. Attfield) 453
New American Remedies (R. Bentley) 456
Manufacture of Kelp (E. C. C. Stanford) 495
Discussion on the above 505

PAGE

Pharmaceutical Society, London, Meetings of:—
Vesicating Collodions (C. R. C. Tichborne) 506
Remarks on the foregoing . . . 508
A Process for Estimating Tannic Acid in Galls (J. H. Marriage) . 509
Discussion on the above . . . 509
Henbane, its Preparation and Doses (B. S. Proctor) 510
New American Remedies (R. Bentley) 540
Hydrastine (J. Dyson Perrins) . 546
Remarks on the above 547
Preparation of Iodide of Potassium and some other Iodides (W. S. Squire) 548
Pharmaceutical Society, Anniversary Meeting:—
Address of the President . . . 591
Report of the Council and Financial Statement 593
———————, Progress of, Correspondence Relating to, 33, 137, 186, 220
———————, Proposed Amended Bye-Laws of 346
———————, Proposed Amended Bye-Laws and Existing Bye-Laws 349
———————, Transactions of. *See* Transactions, etc.
Pharmacopœia, Authority of . . . 393
———————, British 242
———————, Report on (A. B. Garrod) 128
Pharmacy, Eclectic (S. W. Cleave) . 320
———, Influence of the Study of Comparative Therapeutics on (J. Gamgee) 413
———, in Manchester . . . 41, 146
———, at the International Exhibition 538, 585
———————, Representation of 154, 249
Phenol, some Coloured Reactions of (M. Monnet) 483
Phenomena Attending Combustion in Rarefied Air (E. Frankland) . 24
Phipson, T. L., Tinkalzite (Borate of Lime and Soda) from Peru . . . 217
Phosphorus, Alleged Poisoning by . 293
———, Detection of in Cases of Poisoning 158
——— Paste, Poisoning by . . 292
Photozincography 130
Physical Basis of Solar Chemistry (J. Tyndall) 131

PAGE

Physical and Chemical Investigation, Report of the Results of:—
Action of Ammonia and Atmospheric Air on Metallic Copper . 159
——— Nitrous Acid on Salts of the Suboxide of Copper . . . 214
——— Porous Bodies in Inducing Chemical Combinations . . 325
——— Permanganate of Potash on Iodide of Potassium . . . 608
Association of Rubidium with Potassium in Nature 572
Chemical Composition of Magenta 570
——— Nature of the Silkworm's Skin 121
——— Relations of Guanine, Zanthine, Theobromine, and Caffeine 268
Chlorsulphuric Acid 382
Comparative changes of Temperature in the Air and in the Earth 381
Constitution of Aloes 268
Crystallized Manganate of Soda . 326
Detection of Bismuth in Presence of Copper 530
——— Phosphorus in Cases of Poisoning 158
——— Sulphurous Acid . 326
Effect of Filtering the Air in preventing Fermentation, Putrefaction and Crystallization . . . 324
Essential Oil of Chamomile . . . 429
Estimation of Mercury 17
——— Sulphur in Iron or Copper Pyrites 427
Extraction of Silver from Galena . 18
——— Vanadium from Rutile 326
Fertilizing Power of Guano . . 324
Formation of the Green Matter of Leaves under the Influence of the Electric Light 212
Freezing and Boiling Points of Water 211
Nature of the Gas evolved from Leaves during the Decomposition of Carbonic Acid 479
New Form of Barometer . . . 529
Preparation of Asparagin . . . 572
——— Chloroform . . 123
——— Hydrate of Baryta 18
——— Perchloride of Iron 122
——— Sulphuric Acid free from Arsenic 606
Production of Alizarin from Naphthalin 16
——— Chloride and Bromide of Cyanogen 326

PAGE

Physical and Chemical Investigation, Report of the Results of:—
Reduction of Copper in Fine Powder 159
Researches on Galbanum . . . 428
Resin of Scammony 213
Rubidium and Cæsium 270
Solidification of Carbonic Acid . 121
Solubility of Arsenious Acid in Glycerine 213
The Artificial Production of Ice . 121
Valuation of Nitre 213
White Gunpowder 122
Physiological and Therapeutical Effects of Drosera 339
Pill Coverings, and Preparation of a New Medicine, Granular Powders (S. Banner) 374
Pills, Coating (B. S. Proctor) . . . 562
——— Process for Rendering Tasteless (R. C. Furley) 308, 488
——Tasteless (R. C. Furley) . . . 434
——— (S. Banner) 487
Pine-wool (Mr. C. Cooke) 29
Plant, Cinchona, Introduction of into India (C. R. Markham) 611
Plants, Medicinal, Influence of Cultivation on 430
——— Mineral Constituents of (J. Attfield) 447
——— in a State of Life or Action, and their Influence in Nature (R. Bentley) 464
Platinum (Prof. Faraday) 28
Podophyllin (H. N. Draper) . . . 331
Podophyllum peltatum (R. Bentley). 457
Poison, Alleged Death from . . . 436
——— Attempt to Administer . . 390
——— Charge of Administering . . 437
——— of the Toad 291
Poisons not always Poisons (J. Attfield) 453
——— (G. Whipple 533
Poisoning, Accidental . . . 341, 535
———, Prevention of, 106, 192
——— (Mr. Redford) 373
——— Protection against 108
——— by Acetate of Lead . 199, 628
——— Aconite 193
——— Arsenic 198, 213, 342, 390
——— Artificial Flowers . 391
——— Atropine 583
——— Berries of Solanum Pseudo-Capsicum 163
——— at Ceylon, attempt to . 343
——— by Corrosive Sublimate 627

PAGE
Poisoning by Cyanide of Potassium 294, 342
—— ——, Detection of Phosphorus in cases of 158
———— from Diseased Grapes . 386
———— by Fungi in France . . 289
———— Laudanum 46, 151, 199, 289, 341, 342, 436, 628
———— Mistake . . . 294, 628
———— Nitrous Fumes . . . 435
———— Noxious Animals . . . 291
———— by Opium . . 151, 292, 627
———— Phosphorus . . . 292
———— Paste . . 292
————Prussic Acid . 200, 390, 581
———— Strychnine 293
———— Suspected 612
———— by Tincture of Aconite . 199
———— Colchicum 45
Poisonous Effects of Carbonic Oxide (H. Letheby) 531
Pomegranate Root, Bark of, as a Remedy in Tapeworm 629
Porous Bodies, Action of, in Inducing Chemical Combinations 325
Potassium, Cyanide of, Poisoning by 294
———— Iodide of, Preparation of, and some other Iodides (W. S. Squire) 548
Potash, Chlorate of, for Fœtid Breath 246
Potatoes, Deleterious Effects of Light on 287
Potato Disease, Cause and Treatment of (Dr. A. de Barry) 285
Prescribing by Druggists (Huggins *v.* Jonas) 147
Prescription Copies, Certified, a Fee for (W. J. Halliday) 223
Price Mark, Pharmaceutical Dispensing (W. J. Halliday) . . . 338
Primary Colours, Theory of (J. B. Kearney 210
Pritchard, E. W., Treatment of Gout by Guaco 288
Prize, Botanical for 1863 493
Prizes, Distribution of 254
——— for Herbaria 256
Proctor, B. S., Coating Pills . . . 562
————, Henbane and its Preparation and Doses 110
Progress of the Pharmaceutical Society, Correspondence Relating to, 33, 137, 186, 220
Progression and the Bye-Laws . 1, 106
Provincial Transactions. *See* Meetings, Provincial, etc.
russic Acid, Poisoning by . . . 390

PAGE
Prussic Acid, Suicides by . . 200, 581
Pupils, List of, who have Free Admission to the Royal Botanic Gardens. 494
Pyrites, Iron or Copper, Estimation of Sulphur in 427

Quackery 340
Qualification for Appointment as Dispenser in the Army 537
Quekett, Professor, Death of . . . 247
Questions for Examination in Chemistry and Pharmacy 254
———————— Botany and Materia Medica 255
Quinine, Arsenious Acid a Substitute for (J. Turner) 166
——— Green, or Dalleochine . . 291
——— and Opium, Antagonistic Effects of (Dr. Nivison) 277

Rammelsberg, M., Compound of Iodate and Iodide of Sodium . . 579
Red Precipitate Ointment, Preservation of 329
Redford, A., Prevention of Poisoning by Accident 373
Reduction of Copper in Fine Powder 159
Redwood, T., Lecture on Dialysis or Liquid Diffusion 515
Remedies, American, New (R. Bentley) 456, 540
Report of the Results of Physical and Chemical Investigation, etc. *See* Physical and Chemical Investigation, etc.
Resin of Guaiacum, Products of Decomposition of (Hlasiwetz and de Gilm) 483
——— Scammony 213
Responsibility, Pharmaceutical *v.* Free Trade in Physic 489
Reviews :—
Household Medicine (By John Gardner) 437
A Manual of Botany (By R. Bentley) 46
Sketches of the Natural History of Ceylon (By J. Emerson Tennent) 630
The Technologist (By P. L. Simmonds) 152
The Forests and Gardens of South India (By Hugh Cleghorn) . . 295
Reynolds, E. J., Oleaginous Matter Formed on Dissolving Different Kinds of Iron in Dilute Acids . . 162
————, R., Sulphide of Arsenic in Sulphide of Antimony 568
Ricinus inermis (W. F. Daniell) . 15

PAGE
Ringaud, M., Preparation of Vermillion 580
Root of Ginseng 197
Roscoe, Prof., Perchloric Acid and its Hydrates 284
Roth, M., Oil of Sesamum and its Employment in Pharmacy . . . 164
Rubidium, Association of with Potassium in Nature 572
——— and Cæsium 270
Rugby Water Supply 585
Rust in Iron and Steel, Varnish to Prevent 197
Rutile, Extraction of Vanadium from 326
Rye, Carbonized, as a Tooth Powder. 340

Saccharate of Colchicum 150
Sale of Drugs by Grocers 147
Santonine, Syrup of 45
Scammony, Resin of 213
Schneider, M., Detection of Colza Oil when Mixed with other Oils . . 484
Scholarships, Jacob Bell Memorial . 405
——————— Resolution of Council Respecting . . 107
———————, Names of Successful Candidates for . . 253
Schomburgk, Sir R. H., Vegetable Products of Siam 123
Schwartz, M., New Material for Thickening Mordants in Dyeing . 580
Scientific Nomenclature . . . 335, 435
Secretaries, Local, Appointment of . 490
Seemann, B., Anacahuite Wood . . 164
Sesamum, Oil of, and its Employment in Pharmacy (M. Roth) . . 164
Sheep-dipping Composition . . . 46
Sherlock, T., Soda and other Chemical Manufactures of Spain . . 560
Siam, Vegetable Products of (Sir R. H. Schomburgk) 123
Silkworms' Skin, Chemical Nature of 121
Silver, Extraction of, from Galena . 18
Silvering Solution 632
Simmonds, P. L., Notes on Kittool Fibre 280
——————— Trade in Liquorice 623
Sinapisms, New Formulæ for . . 246
Skinner, T., Granulation of Medicines 572
Slugg, J. T., Aërolites 225
Small Pox, Reputed Specific for . . 323
Smith, J., Dental System of Man and the Lower Animals 514
Soda and other Chemical Manufactures of Spain (T. Sherlock) . . 560
—— Carbonate of, Manufacture of (A. N. Tate) 561
—— Crystallized Manganate of . . 326

PAGE
Sodæ Carbonas Siccata, Improved Method of Preparing (H. N. Draper) 129
Sodium, Iodate and Iodide, Compound of (M. Rammelsberg) . . 579
Solanum Pseudo-Capsicum, Case of Poisoning by the Berries of (M. Montané) 163
Solar Chemistry, Physical Basis of (J. Tyndall) 131
Solidification of Carbonic Acid . . 121
Special General Meeting for the Confirmation of the Bye-Laws . 397, 550
——— Meeting of Council: Appointment of Special General Meeting 348
Specific for the Small Pox, Reputed 323
Spectrum Analysis, Apparatus for (A. Waugh) 426
——————— Lecture on (Dr. W. A. Miller) 397
——————— by S. Macadam, Notice of 478
Spirit, Beetroot, Distillation of, in this Country 183
——— Methylated, License for the Sale of 183
——————— for Tinctures, Correspondence relating to . . . 486
Springs, Lithia, of Baden Baden (J. Althaus) 577
——— Oil of America and Canada 435
Squire, P., Medicinal Extracts, taking Belladonna as an Example . 300, 368
Squire, W. S., Preparation of Iodide of Potassium and some other Iodides 548
Stanford, E. C. C., Manufacture of Kelp 495
Starch of Unripe Fruits (M. Payen) 386
Stenhouse, J., Some Varieties of Tannin 329
Stills or Retorts, Licence for the Use of 202
Stones, Meteoric 44
Strychnine, Colour Tests for, and Diagnosis of the Alkaloids (W. A. Guy) 11, 112
——————— Poisoning by 293
Students, Medical and Pharmaceutical, Professional Education of (R. Bentley) 333
Suboxide of Copper, Salts of, Action of Nitrous Acid on 214
Subscriptions to the Jacob Bell Memorial Fund . . 157, 251, 349, 444
Subscribers to the Benevolent Fund 492
Suicides by Acetate of Lead . . . 199

PAGE
Suicides Attempted 199
——————— by Laudanum . 151, 436, 628
——— by Laudanum . . . 199, 289
——— Prussic Acid . . . 200, 581
Sulphate of Alumina and Zinc, the Local Employment of 246
——— of Aniline, Properties of (Dr. Turnbull) 284
Sulphide of Arsenic in Sulphide of Antimony (R. Reynolds) . . . 568
Sulphur, Estimation of in Iron and Copper Pyrites 427
Sulphuric Acid, Death from Burning by 291
——— Free from Arsenic, Preparation of 606
——— Fumes, Death from 291
Sulphurous Acid, Detection of . . 327
Supply of Medicines to Charitable Institutions: Luckombe and Another *v.* Ashton and Another . . 534
Symons, W., Casella's Thermometer 380
——— New Mercurial Thermometer 323
Syrup of Chloroform 45
—— Santonine 45
Syrupus Ferri et Quinæ Hypophosphitis 488

Tænifuges (Anthelmintics) of Abyssinia (Dr. Courbon) 20
Tannic Acid in Galls, Process for Estimating (J. H. Marriage) . . 509
———, New Method of Estimating (M. K. Hammer) . . . 433
Tannin, Some Varieties of (J. Stenhouse) 329
Tapeworm, Bark of Pomegranate Root as a Remedy for 629
Tar, Coal, Colouring Matters Derived from 166
Tasteless Pills (S. Banner) 488
——— (R. C. Furley) . . . 434
———Process for Coating . . 488
Tate, A. N., Composition of Chloric Ether 533
——— Manufacture of Carbonate of Soda 561
Temperature in the Air and in the Earth, Comparative Changes of . 381
Testimonial, Presentation of, to Professor Bentley 603
Theobromine, etc., Chemical Relations of 268
Theory of Three Primary Colours (J. B. Kearney) 210
PAGE
Theory of Three Primary Colours (J. C. Maxwell) 179
Thermometer, Casella's (W. Symons) 380
——— New Mercurial Minimum (J. Attfield) . . . 264
Thermometer, New Mercurial Minimum (W. Symons) 323
Thomson, Dr. M., Historical Remarks on the Edinburgh School of Chemistry and its Teachers . . . 550
Tichborne, C. R. C., Vesicating Collodions 506
Tinctura Arnicæ 46
Tincture of Aconite, Accidental Poisoning by 199
——— Large Dose of (J. W. Kay) 243
——— Colchicum, Accidental Poisoning by 45
———Sumbul 152
Tinctures, Methylated Spirit for, Correspondence Relating to . . 486
Tinfoil, Adulteration of 440
——— (J. H. Baldock) 378
Tinkalzite (Borate of Lime and Soda) from Peru (T. L. Phipson) . . . 217
Toad, Poison of 291
Toothache, Escharotic for 197
Tooth Powder, Carbonized Rye as 340
Toys, Arsenical 198
Toussaint and Kelle, Preparation of Oxalic Ether 580
Trade in Liquorice (P. L. Simmonds). 623
Transactions of the Pharmaceutical Society, 4, 107, 157, 251, 299, 348, 396, 443, 491, 589
Tree, Etna, Observations on . . . 182
Trifolium in Fœno, a Remedy for Hooping-cough 32
Turnbull, Dr., Properties of Sulphate of Aniline 284
Turner, J., Arsenious Acid a Substitute for Quinine 166
Turpentine as an Anæsthetic . . . 32
Tyndall, Dr., Physical Basis of Solar Chemistry 131

Useful Plants of Paraguay . 18, 214, 272

Valenciennes, M. Jun., Preparation of Castorin 329
Valuation of Nitre 213
Vanadium, Extraction of from Rutile 326
Varnish to Prevent Rust in Iron and Steel 197

PAGE

Vegetable Products of Siam (Sir R. H. Schomburgk) 123
Vermilion, Preparation of 580
Vesicating Collodion (C. R. C. Tichborne) 506
Vizer, Mr., Letter from 43

Water; Action of on Lead 283
——— Barometer 218
———, Freezing and Boiling Points of 211
———, Supplied by the City Pumps, Condition of 197
——— Supply, Rugby 583
Waters, Distilled, of Bitter Almonds and Cherry Laurel (M. Mayet) . 161
Waugh, A., Apparatus for Spectrum Analysis 426

PAGE

Weatherly, W. H., Oleum Gossypii, Cotton Seed Oil 30
Weight, Comparative, of Drops of Various Fluids 435
Well, Deep, at Brighton 621
Whipple, G., Poisons not always Poisons 533
White Gunpowder 122, 245
Wilkinson, W., Ferri Ammonio-Phosphas 425
——— Pharmacy in Manchester . 147
Wood, Anacahuite (B. Seemann) . 164
Wool, Pine (M. C. Cooke) 29

Zanthine, etc., Chemical Relations of 268
Zinc and Sulphate of Alumina, Local Employment of 246

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